Management of Government

Major Surveys

A Study Team Report
to the Task Force on Program Review

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MAJOR SURVEYS

A Study Team Report
to the Task Force
on Program Review
July 31, 1985

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FOREWORD

The Task Force on Program Review was created in September 1984 with two major objectives - better service to the public and improved management of government programs. Recognizing the desirability of involving the private sector in the work of program review, assistance from national labour, business and professional organizations was sought. The response was immediate and generous. Each of these national organizations selected one of their members to serve in an advisory capacity. These public spirited citizens served without remuneration. Thus was formed the Private Sector Advisory Committee which has been responsible for reviewing and examining all of the work of program review.

The specific program reviews have been carried out by mixed study teams composed of a balance of private sector and public sector specialists, including representatives from provincial and municipal governments. Each study team was responsible for the review of a "family" of programs and it is the reports of these study teams that are published in this series. These study team reports represent consensus, including that of the Private Sector Advisory Committee, but not necessarily unanimity among study team members, or members of the Private Sector Advisory Committee, in all respects.

The review is unique in Canadian history. Never before has there been such broad representation from outside government in such a wide-ranging examination of government programs. The release of the work of the mixed study teams is a public acknowledgement of their extraordinarily valuable contribution to this difficult task.

Study teams reviewed existing evaluations and other available analyses and consulted with many hundreds of people and organizations. The teams split into smaller groups and consulted with interested persons in the private sector. There were also discussions with program recipients, provincial and municipal governments at all levels, from officials to cabinet ministers. Twenty provincial officials including three deputy ministers were members of various study teams.

The observations and options presented in these reports were made by the study teams. Some are subjective. That was necessary and appropriate considering that the review phase of the process was designed to be completed in a little more than a year. Each study team was given three months to carry out its work and to report. The urgent need for better and more responsive government required a fresh analysis of broad scope within a reasonable time frame.

There were several distinct stages in the review process. Terms of reference were drawn up for each study team. Study team leaders and members were appointed with assistance from the Private Sector Advisory Committee and the two Task Force Advisors: Mr. Darcy McKeough and Dr. Peter Meyboom. Mr. McKeough, a business leader and former Ontario cabinet minister, provided private sector liaison while Dr. Meyboom, a senior Treasury Board official, was responsible for liaison with the public sector. The private sector members of the study teams served without remuneration save for a nominal per diem where labour representatives were involved.

After completing their work, the study teams discussed their reports with the Private Sector Advisory Committee. Subsequently, their findings were submitted to the Task Force led by the Deputy Prime Minister, the Honourable Erik Nielsen. The other members are the Honourable Michael Wilson, Minister of Finance, the Honourable John Crosbie, Minister of Justice, and the President of the Treasury Board, the Honourable Robert de Cotret.

The study team reports represent the first orderly step toward cabinet discussion. These reports outline options as seen by the respective study teams and present them in the form of recommendations to the Task Force for consideration. The reports of the study teams do not represent government policy nor are they decisions of the government. The reports provide the basis for discussion of the wide array of programs which exist throughout government. They provide government with a valuable tool in the decision-making process.

Taken together, these volumes illustrate the magnitude and character of the current array of government programs and present options either to change the nature of these programs or to improve their management. Some decisions were announced with the May budget speech, and some subsequently. As the Minister of Finance noted in the May budget speech, the time horizon for implementation of some measures is the end of the decade. Cabinet will judge the pace and extent of such change.

These study team reports are being released in the hope that they will help Canadians understand better the complexity of the issues involved and some of the optional solutions. They are also released with sincere acknowledgement to all of those who have given so generously of their time and talent to make this review possible.

TERMS OF REFERENCE

PURPOSE

The Major Surveys Study Team will review the major national survey programs and related information dissemination systems. These programs and systems describe the people of Canada, their activities, and the environment in which they live and work. A preliminary examination of these surveys indicates that they deliver a great deal of essential information at a relatively modest cost. The purpose of the Major Surveys Study Team is to evaluate the various programs and to propose means for improving their public utility, efficiency, and effectiveness. The review will encompass present and emerging needs and will take into account the potentials offered by developing technology, and the emergence of capabilities in other levels of government, the private sector and educational institutions.

BACKGROUND

From the earliest days of Canada's evolution, surveys of national resources were considered essential tools for the orderly development and administration of the new country, including considerations of public safety, and to attract settlers and capital. For example the census, geological, topographical and early hydrographic surveys began before confederation and later grew into major systematic national surveys reflecting national standards of integrity and reliability.

Today the Government of Canada spends at least three-quarters of a billion dollars each year, and employs more than 10,000 persons annually, in surveying and in processing and distributing the results from the major and related surveys.

Over the years the major surveys have generated large banks of valuable data which constitute a substantial cumulative investment on the part of Canadian taxpayers. Canada will continue to need accurate and timely information from the major surveys to effectively plan, monitor and evaluate its development, to administer its internal affairs and to attract investment capital. New and powerful computer-based analytical techniques are now available to support such activities. But these impose more stringent demands on data quality and organization.

The Government of Canada must increasingly ensure that the investments made in the major surveys generate maximum returns. The results must meet the needs of a multiplicity of purposes, they must be readily accessible to users and be kept up to date as cost effectively as possible.

Similarly, the major surveys must be forward thinking in anticipating user needs, and in identifying the need for integration of surveys, as well as the development of standards for the exchange of survey data between agencies and the different levels of government. Thus there will be some assurance that duplication in data gathering is minimized and mutual consistency and maximum interchangeability and integration will be achieved.

The complexity of issues facing all sectors of Canadian society does not allow for a simplistic view of the world as a series of individual disciplines to be surveyed. From the point of view of data collection, management and dissemination, differentiation between federal, provincial or municipal data is becoming less meaningful. We deal with data about the same Canadians, the same land and infrastructure except perhaps in more or less detail. Therefore it will be in the national interest that co-ordinated, if not integrated, efforts in major surveys are made between all levels of government.

A serious concern emerging from the use of new technology is the need to protect the privacy of individual Canadians in the context of linking information from different sources. This suggests the need for great care in considering the potential of various administrative data bases for secondary purposes.

Opportunities for the technology and service industry may exist in the development and implementation of major data collection and data management techniques. Similarly, universities and industrial research capacities in Canada could make a significant contribution. Their potential participation in achieving the national survey tasks will be deliberately explored.

The study team will be considering these issues as it conducts its review of federal programs relating to the major surveys.

TERMS OF REFERENCE

The Ministerial Task Force on Program Review seeks the advice and recommendations of the study team regarding the major surveys programs of the federal government with the ultimate goals of establishing simpler, more understandable and more accessible programs for those served. Emphasis will be placed upon decentralizing program activities as far as possible to those who are in direct contact with client groups. Included in the advice given could be observations regarding:

- the overall requirement for, and benefits derived from, the major surveys in Canada;
- opportunities to co-ordinate and consolidate major surveys programs within the federal government;
- considerations relating to historical continuity and internal consistency of survey information;
- the potential for secondary use of administrative data bases to supplement or possibly replace survey activity, and the possible mechanisms to realize that potential;
- duplication in federal program expenditures;
- programs that might be eliminated;
- programs that could be reduced in scope;
- programs whose basic objectives are sound but whose form should be changed;
- alternative approaches for achieving efficiencies in surveys information gathering, management and dissemination tasks;
- programs which could be, either in whole or in part, more efficiently and effectively delivered by private sector organizations;
- possibilities and mechanisms for improved federal-provincial and private sector consultation, co-ordination and program integration;
- the legislation that would be required to implement proposed program changes; and
- resource implications of any proposed program changes, including increased costs or savings and the number and distribution of proposed staff increases or decreases.

The study team will conduct a review of those programs listed in Annex A and any related programs deemed appropriate for review as its examination of the major surveys proceeds.

As background to its conclusions and recommendations the study team is asked to obtain and evaluate the following information:

BENEFICIARIES

Considering the Task Force's mandate to bring better service to the public and greater efficiency to the government, the study team will examine:

- current legislation articulating the benefits and mandate of the information development activities of departments of government;
- the users and the kinds and extent of use of information generated by the major surveys;
- the geographic and sectoral distribution of the users of information generated by the major surveys;
- the utility, quality and timeliness of delivery of products and services experienced by the clientele;
- possible implications of the distinction between information developed in response to specific, well-defined needs and information developed as a basis for the more general understanding, analysis, anticipation and formulation of the problems and opportunities facing society; and
- the capability of the private sector to conduct major surveys and the extent to which it has been used.

EFFICIENCY AND OVERLAP

In the context of the most cost-effective delivery of services to users the study team will review:

- the quality of planning and consultation occurring to ensure continuing program relevance;
- considerations relating to the efficiency of program operation and alternative modes of program delivery;
- the emphasis on research and development functions relating to the major surveys and the management thereof;
- the effectiveness of updating information bases and the frequency required for repeat information gathering cycles;

- the amount of inter-program sharing, integration and co-operation in methodology and classification systems development, technology development and information dissemination within the federal government;
- the federal government information publication and dissemination procedures related to the major surveys;
- the overlaps and linkages within major surveys being conducted in the federal government and by the provinces and industry, including the possibility of using provincial data bases and major federal administrative information data bases to complement or replace parts of existing major surveys; and
- survey and information dissemination approaches being used by the provinces and by other countries (e.g. U.S.A., U.K., Australia, E.E.C. and Japan).

GAPS AND OMISSIONS

The study team may review other programs or parts of programs which are not listed in Annex A but which emerge during the course of its investigations as requiring examination under the major survey theme.

ACCESS TO INFORMATION, OTHER REVIEWS AND CONSULTATION

The study team will have access to all reviews, studies, or evaluations or evaluation tools relating to the programs included in this review. Consultation will be sought with those currently conducting departmental program reviews, including the reviews of other Task Force study teams which relate to Major Surveys.

COMPOSITION OF THE STUDY TEAM

The study team will be led by Jim Stanley, President of Maritime Resource Management Service Inc., a Maritime regional Crown corporation. The team leader will report to both the Public Sector and the Private Sector Liaison Advisor serving the Chairman of the Task Force. In addition, the teams will consist of a Deputy Team Leader and six other members with a balanced senior management representation from government, and the private sector. Part-time support officers for special assignments and an administrative assistant will be seconded from the federal public service.

WORK PROGRAM

Upon approval of its Terms of Reference, the study team will submit a work plan for consideration by the Ministerial Task Force showing the activities to be undertaken by the study team and the schedule for accomplishing the work required.

COMMUNICATIONS WITH DEPARTMENTS

Ministers of departments directly affected by this review will be advised which programs under their jurisdiction will be included. In addition, the study team will initiate appropriate liaison and consultations with deputy ministers and senior managers whose programs are affected by the study.

These Terms of Reference have been reviewed by the Deputy Ministers of Energy, Mines and Resources, Fisheries and Oceans, Environment, Agriculture, Supply and Services, Health and Welfare, National Revenue (Taxation), Labour, by the Auditor General and the Chief Statistician for Canada, and by the Secretary of the Treasury Board.

REPORTING SCHEDULE

The study team is requested to report its findings on or before July 31, 1985. In addition, the Ministerial Task Force will receive brief progress reports at regular meetings.

ANNEX A

MAJOR SURVEYS

DEPT.	PROGRAM	PROPOSED PROGRAM LIST
AGC		Land and Water Resources Research Institute
AGC	402	National Forestry Statistics
AGO	1	Auditor General
EC	1	Weather Services
EC	7	Air Quality and Atmospheric Research
EC	96	Climatic Services
EC	100	Water Management Data
EC	102	Land Monitoring Evaluation Data System
EC		Ice Services
EMR	91	Earth Physic Research and Information
EMR	97	Remote Sensing
EMR	300	Surveys and Mapping
EMR	301	Geological Surveys and Research
F&O	12	Oceanographic Data (Bedford Institute)
F&O	15	Fisheries Statistics and Analysis
F&O	101	Charts
HWC	41	Welfare Management Information System
HWC	103	National Health Surveillance
LC	24	Surveys Division (Labour Canada)
RCT	12	Sub-element 1.3 - Returns Processing (Information)
SC	101-124	Statistics Canada (all Programs)
SSC	17	Canadian Government Publishing Centre
SSC	100	Supply Admin. Printing Production
SSC	101	Advertising Management Services Branch

LIST OF TEAM MEMBERS

Team Leader	Jim Stanley President Maritime Resource Management Services Amherst, Nova Scotia
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	Paul Deacon Vice-President MacLean Hunter Limited Ottawa, Ontario
	Carl Sonnen Vice-President Informetrica Ottawa, Ontario
Public Sector Members	David A. Worton Assistant Chief Statistician of Canada Statistics Canada Ottawa, Ontario

Alan Walton
Director General
Central Region, Ocean Science and Surveys
Fisheries and Oceans
Burlington, Ontario

Mr. Ray Fichaud
Regional Director, Quebec Region
Atmosphere Environment Services
Montreal, Quebec

Jana Outrata, Chief
Information Processing Services
Canadian Transport Commission
Hull, Quebec

OVERVIEW

A MATTER FOR LEADERSHIP

Federal major surveys cost the Canadian taxpayer over three-quarters of a billion dollars each year and employ slightly more than 10,000 persons. They collect basic information about the country, its people, its economy, its natural resources and its environment.

All levels of government need reliable information. They need information on the same subjects - a national approach must therefore be taken. Furthermore, the traditional emphasis on data collection must shift to information applications. Many provinces have taken this challenge seriously in recent years and have led the Government of Canada in the effective organization and use of their information bases. The need for renewed and stronger leadership at the national level is clear. The changes required would not come easily but they would be important to the future health and well-being of the nation. The time for decisive action is now!

No one has been paying much attention to the federal surveys as a system. In the view of the study team someone should! There are major opportunities to make survey taking more efficient, to make access to surveying information easier, and to save Canadian taxpayers tens of millions of dollars annually. Federal information needs must be clearly defined . More harmony and program integration should come about in our survey-taking and information-sharing with provinces. We need to make more effective use of new technology. New wealth can be generated for Canada by expanding our capacity in industry to take surveys and by selling our surveying and information technology to others. Canadian business and Canadians want and need useful, accurate and timely information about their country from their governments. Freer access to government information means lower costs to Canadian industries and higher levels of competitiveness for those industries.

DOING THE RIGHT THINGS

How do you decide what basic information is the right information to run a country? Ideally you decide what needs to be done, who is responsible for what, and which organizations should gather the information required to get those jobs done. The Constitution Act provides for the division of responsibilities in Canada and other statutes have produced the detailed framework of law. Practices, developed over years, have generally followed this legal framework. In essence the right information has been gathered to carry out the tasks. However, in a number of cases the federal government is gathering information which is being used primarily to carry out provincial responsibilities. However, the matter of "Are we gathering the right information?" is not the major issue for the Government of Canada.

DOING THINGS RIGHT

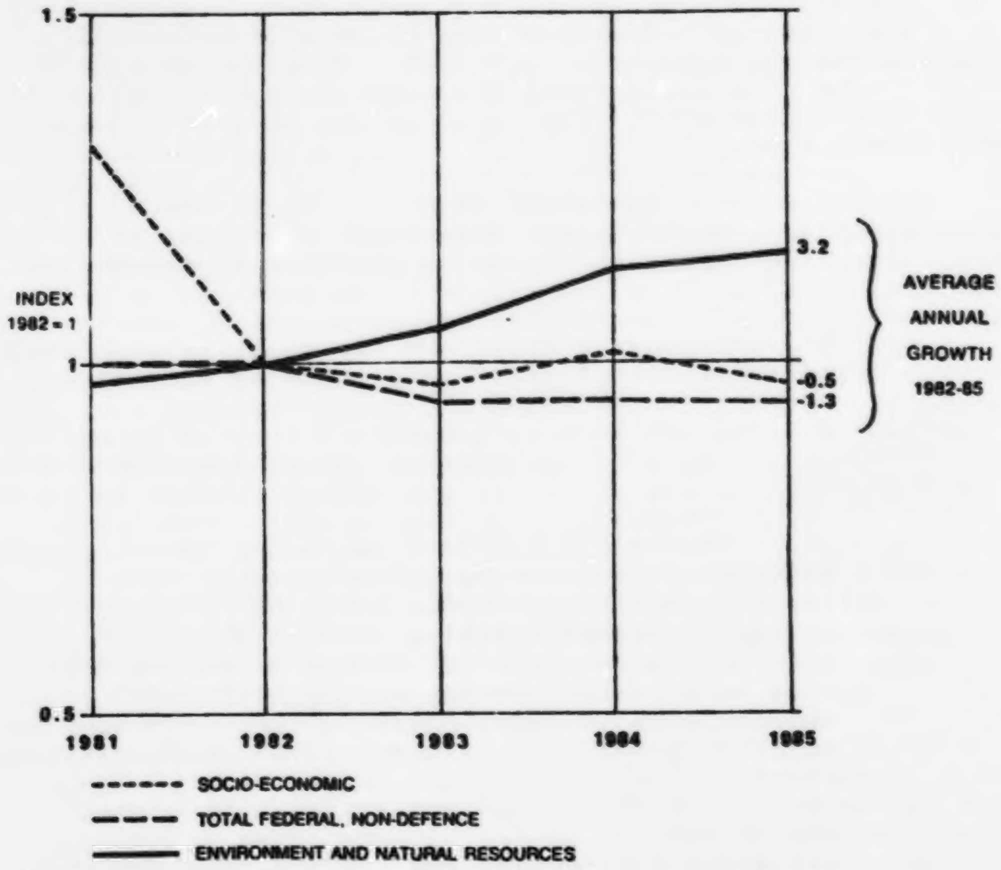
Socio-economic surveys cost about $220 million annually and employ 4,500 persons. Natural resource and environment surveys cost $550 million and employ over 6,000 people. In the view of the study team the costs are too high and the system is inefficient, particularly for the natural resource and environment surveys. We are not doing it right!

Demands on the nation's information system are changing, becoming more complex and intensive and the system must respond. Our natural resources can no longer be easily and cheaply exploited. They are limited and must be carefully managed if sustained development is to result and if our competitiveness is to be enhanced. At the same time citizens demand clean air, pure water, economic stability and regional equality and continuing social benefit programs from government. The major surveys must respond to these demands with greater efficiency and there should be more sophisticated information systems aimed at decision-making on national priority issues.

The evidence for effective surveying responses to the new pressures is lacking, particularly in the natural resource and environmental fields. For example on expenditures, Figure 1 illustrates the changes, in constant dollar funding levels, for the socio-economic and natural resource and environment surveys against the total federal non-defence spending since 1981-82. Natural resource and environment survey funding has grown at an average rate of 4.5 per cent above the rest of the government but with no obvious measure of improved delivery from the system as a whole. Socio-economic survey funding has remained constant over the same period and productivity has clearly improved. Hence our concern! We are not doing things right to gain

Figure 1

CONSTANT DOLLAR OPERATING EXPENDITURES, TOTAL FEDERAL AND SURVEYS



the efficiency we badly need. There is compelling evidence in the natural resources and environment surveys of:

- duplicated and excessive overhead costs;
- lack of clear coordinated top down direction for survey priorities;
- science, rather than government policy needs, driving surveys;
- lack of clarity in federal and provincial purpose;
- poor interdepartmental planning and coordination on survey taking and information dissemination.

There are many fiefdoms and no one is specifically responsible for the whole territory. The impacts are clear. There is little real directed pressure on the natural resource and environment surveys to strive for efficiencies.

In the view of the study team six issues need leadership and action by the Government of Canada if significant efficiencies are to be realized in the major surveys:

a. Federal funding decisions for major surveys should be focused on federal priorities in a co-ordinated manner.
b. Federal and federal-provincial program integration should be actively pursued, thereby avoiding duplication of tasks, and adding clarity to survey objectives.
c. New technologies for data gathering, development and information dissemination must be used to improve efficiency, while being controlled so that wasteful capital spending is avoided.
d. Contracting out of major blocks of survey activities to private industry should be pursued aggressively to lower costs to the government and to build a base for a competitive Canadian survey industry.
e. Separation of science activities from survey activities.
f. The federal direction and organization for the major surveys need to be changed in order to achieve the above.

Two significant expenditures, now on the federal government's plate, could wipe out all of the potential savings identified by the Major Surveys Study Team. They are the $500 million Radarsat Satellite project and the expenditure of an estimated $80 million on moving part of the Surveys and Mapping Branch from Ottawa to Sherbrooke, Quebec. Neither will improve the efficiency of the federal major surveys programs.

SCIENCE AND SURVEYS

Science and surveys are not the same thing and ideally should not be managed in the same program. Generally, the surveys focus on data gathering to describe resources. Science, drawing upon that and other data, focuses on building new knowledge. The two are closely related and feed on each other but they are not the same and cannot be managed effectively in the same way. The mixing of science and survey activities in the major surveys programs confuses funding decisions as the two respond to different priorities. Science should be driven by the longer term need to develop a unique Canadian technology and knowledge base. Surveys should generate the basic information required to run Canada. Furthermore, science should increasingly be funded by all the "stakeholders" who have an interest in the results. The federal government should be very concerned with surveying only those subjects for which there is a federal need for information.

PRIVATE INDUSTRY CAN DO IT CHEAPER

Government doesn't have to do the job alone. We are convinced that a competitive Canadian private industry could be much more extensively utilized to gather survey data. Industry, if given easier access to data gathered in government, would generate wealth and taxes by developing value-added uses of data for other customers. The whole economy would benefit, especially when the export of Canadian expertise and technology can be promoted. This opportunity and this approach support the policies of the government for enhancing the private sector in Canada. But government needs to set clear standards for the data it gathers and needs to monitor and set strict rules when personal confidentiality and privacy are at issue.

Experience in the United States indicates that by using such a "contracting out" approach, government can save up to 20 per cent of the cost to taxpayers. One caution: the industry must be competitive and fair tendering practices must be followed. There is no point in developing a private monopoly from a government monopoly; the costs to the taxpayer will not come down under those circumstances.

GETTING INFORMATION OUT

Government information is gathered for the public good. Once developed it should be made available to all at the lowest possible price, either at the marginal cost of access, or at a minimum fee which would deter capricious use. There are trends and pressures for increased fees for government information products; this "hidden tax" is inconsistent with the principle that easy access to government information promotes competitiveness in industry and a better functioning society. If taxpayers have paid for information to be gathered once why should they be expected to pay any portion of those information gathering costs again?

The challenge for government is to organize its information so that it meets its own needs effectively and makes it easily and cheaply accessible to all users. The socio-economic surveys, through Statistics Canada, handle this task effectively. The natural resource and environment surveys, on the whole, do not. With computers, data banks and modern telecommunications, these functions are being revolutionized. There are growing opportunities for value-added industries based upon government data. These should be encouraged. There is a great deal of work to be done in making government information more accessible and the pay-offs for Canadians could be large.

ORGANIZING TO DO IT RIGHT

Figure 2 shows a generalized model for major survey programs. Figure 3 shows the organization in place for federal socio-economic surveys (Statistics Canada). It stands as a model for all federal government survey activity because it works well. Although most of the functions outlined in Figure 2 are performed within each natural resource and environment survey, as Figure 4 demonstrates there is no coordination or consolidation among the survey programs. Deeply rooted in history, this approach to organization is inefficient and wasteful in the study team's view. We conclude, therefore, that these survey programs should follow the Statistics Canada model more closely.

There is, in addition, a growing need for the integration of natural resource and environment and socio-economic data to meet decision-making priorities in Canada. Therefore, the Major Surveys Study Team proposes the consolidation of all major survey programs under the control of one federal minister. This minister would need a strong advisory council, composed of the major stakeholders to make the changes proposed responsive to user needs. We are aware that this reorganization proposal has major impacts on the natural resource and environmental policy departments in the federal government and in the provinces. These impacts need to be carefully considered before the final decision is taken.

THE BOTTOM LINE

If all of our suggestions are accepted, the Government of Canada would save Canadian taxpayers in excess of $100 million a year by 1990. The proposals would also assure effective control over this area of government activity.

There will be one and only one opportunity to get the situation set right for the challenge ahead ... This is it!

Figure 2

INFORMATION MODEL FOR MAJOR SURVEYS

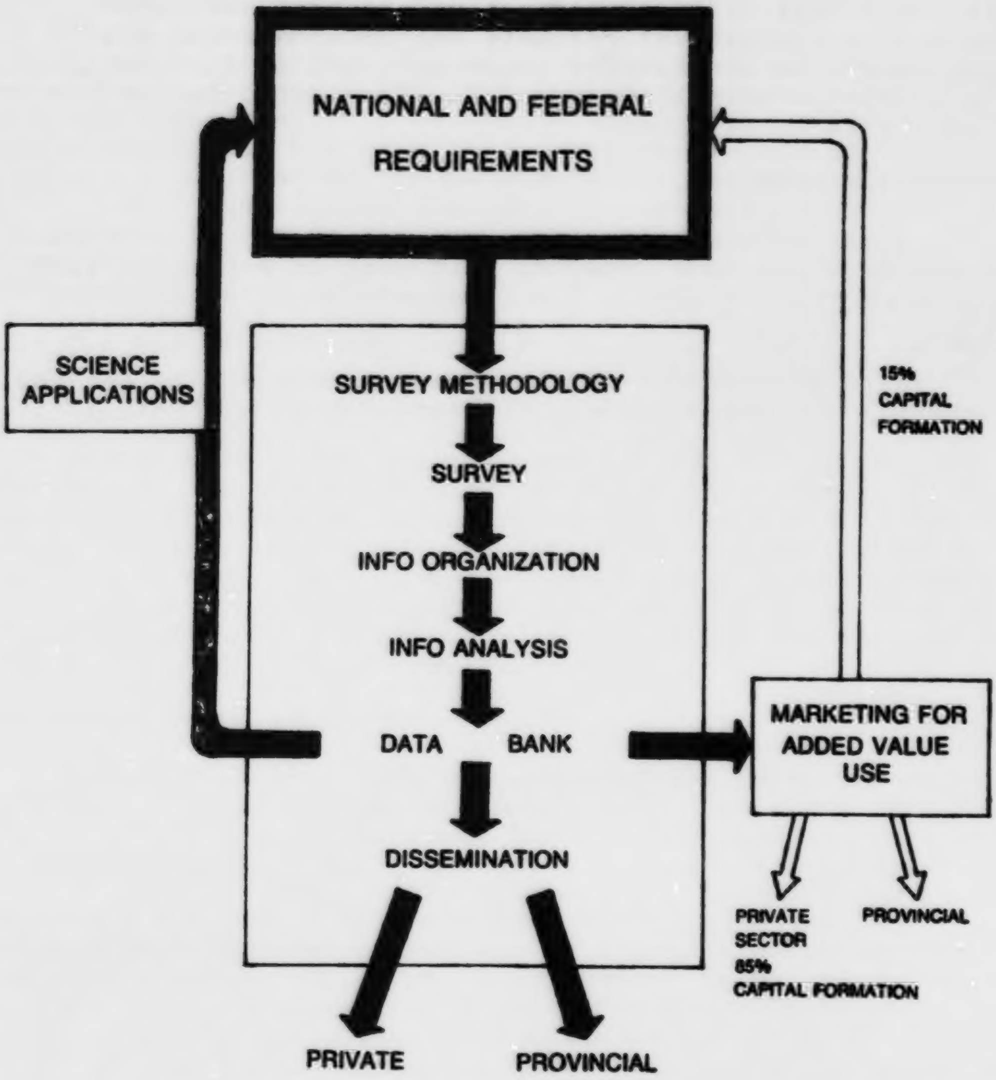
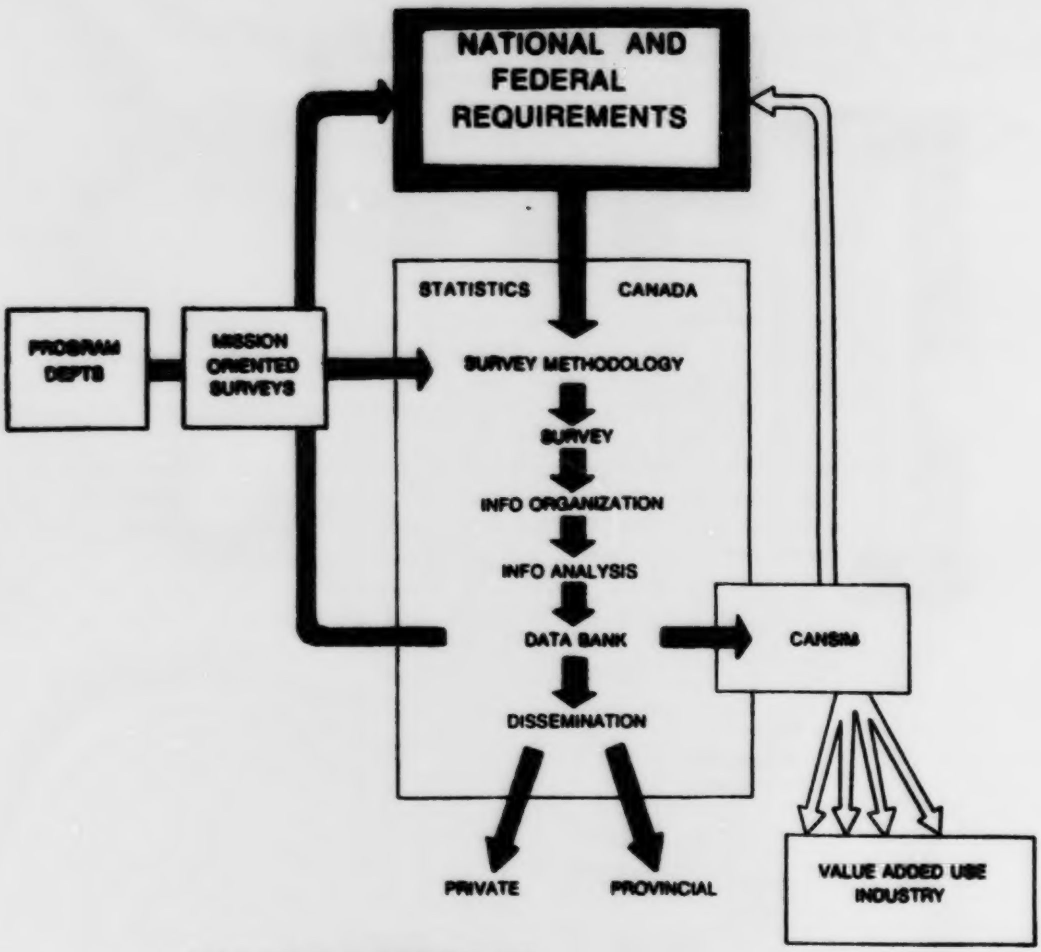

NATIONAL AND FEDERAL REQUIREMENTS
SCIENCE APPLICATIONS
SURVEY METHODOLOGY
SURVEY
INFO ORGANIZATION
INFO ANALYSIS
DATA BANK
DISSEMINATION
PRIVATE
PROVINCIAL
15% CAPITAL FORMATION
MARKETING FOR ADDED VALUE USE
PRIVATE SECTOR 85% CAPITAL FORMATION
PROVINCIAL

Figure 3

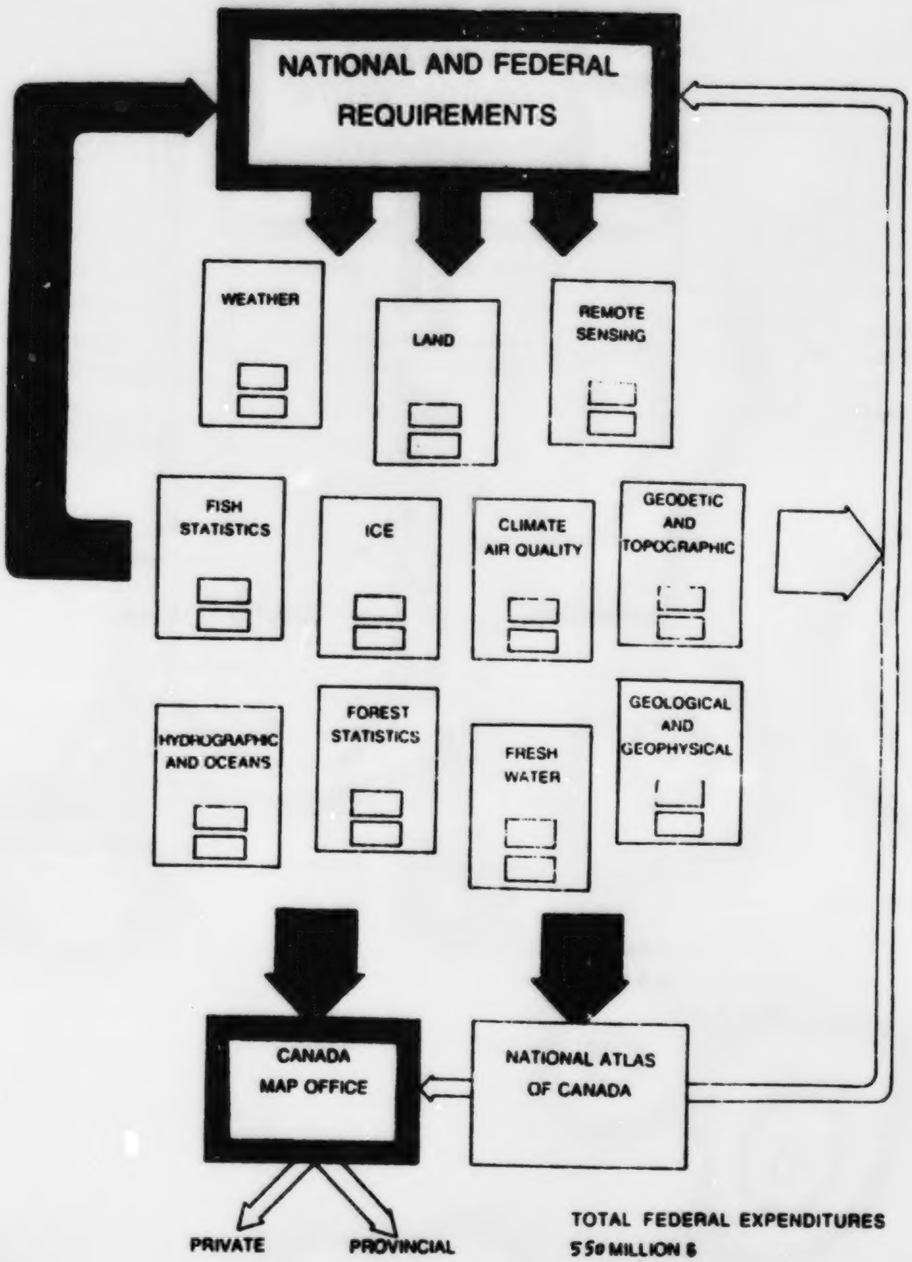
SOCIO-ECONOMIC SURVEYS


NATIONAL AND FEDERAL REQUIREMENTS
STATISTICS CANADA
PROGRAM DEPTS
MISSION ORIENTED SURVEYS
SURVEY METHODOLOGY
SURVEY
INFO ORGANIZATION
INFO ANALYSIS
DATA BANK
CANSIM
DISSEMINATION
PRIVATE
PROVINCIAL
VALUE ADDED USE INDUSTRY

TOTAL FEDERAL EXPENDITURES
256 MILLION $
4560 P.Y.'s

Figure 4

ENVIRONMENT AND NATURAL RESOURCES SURVEYS


NATIONAL AND FEDERAL REQUIREMENTS
WEATHER
LAND
REMOTE SENSING
FISH STATISTICS
ICE
CLIMATE AIR QUALITY
GEODETIC AND TOPOGRAPHIC
HYDROGRAPHIC AND OCEANS
FOREST STATISTICS
FRESH WATER
GEOLOGICAL AND GEOPHYSICAL
CANADA MAP OFFICE
NATIONAL ATLAS OF CANADA
PRIVATE
PROVINCIAL

TOTAL FEDERAL EXPENDITURES
550 MILLION $
6470 P.Y.'s

SUMMARY OF ESTIMATED EXPENDITURES ON MAJOR SURVEYS[1]
($ million)

	FY 81-82	FY 82-83	FY 83-84	FY 84-85	FY 85-86
Environmental and Natural Resources Surveys	311.5**	406.0**	451.3	528.3	550.5
Socio-Economic Surveys	259.1	219.4	232.4	254.4	255.8
TOTAL	570.6**	625.4**	683.7	782.7	806.3

---

[1] Summary of estimated expenditures, net of revenues to the Consolidated Revenue Fund, as reported to the major survey team by responsible departments.

****(Note)** The survey team estimated that expenditures of approximately $40 million in Fiscal Year 1981-82 on Environmental and Natural Resource Surveys were not reported to the team due, in large part, to organizational changes and related modifications to accounting systems in responsible departments. In fiscal year 1982-83, this nonreporting is estimated to decline to $3 million.

SUMMARY OF ESTIMATED EXPENDITURES ON MAJOR SURVEYS[1] (\$000's)

	FY 81-82	FY 82-83	FY 83-84	FY 84-85	FY 85-86[2]
Air Quality and Atmospheric Research	N/A	8,883	12,158	14,197	12,530
Auditor General	31,881	34,098	37,512	40,245	42,968
Canadian Hydrographic Service (F&O)	49,799	40,555	46,826	63,299	47,930
Climate Services and Research (EC)	4,772	5,396	6,730	7,606	7,349
Earth Physics Branch (EMR)	10,861	13,068	14,677	18,224	16,829
Fisheries Statistics (F&O)	N/A	N/A	3,535	5,030	N/A
Forestry Statistics (AG)	1,064	2,063	2,298	2,392	796
Geological Survey (EMR)	40,848	49,805	54,086	70,006	85,438
Ice Services (EC)	11,847	14,716	16,023	19,746	28,949
Labour Canada - Wages and Working Conditions Survey	1,020	1,099	918	1,053	975
Land Resources Research Institute (AG)	4,863	5,875	6,652	7,650	7,700
Lands Directorate (EC)	N/A	6,716	6,632	5,457	5,148
National Health and Welfare (Welfare M.I.S.)	2,963	3,563	3,394	3,545	2,766

	FY 81-82	FY 82-83	FY 83-84	FY 84-85	FY 85-86[2]
Oceanographic Data (F&O)	37,882	48,274	55,615	69,731	63,506
Canada Centre for Remote Sensing (EMR)	18,300	30,700	28,900	32,200	44,400
Revenue Canada - Taxation Data Base	1,739	2,032	2,397	2,546	2,878
Statistics Canada	221,487	178,566	188,184	206,996	206,184
Surveys and Mapping (EMR)	40,400	43,900	50,800	53,500	60,700
Water Management Data (EC)	N/A	25,185	29,260	30,537	32,650
Weather Service	90,852	110,913	117,094	128,703	136,600
TOTAL	570,578	625,407	683,691	782,663	806,297

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[1] Estimated expenditures, net of revenues to the Consolidated Revenue Fund, as reported to the major survey team by responsible departments.

[2] Planned expenditures

INTRODUCTION TO THEME PAPERS

Timely access to reliable information is a determining, and at times decisive, factor in the success of any enterprise. Many enterprises invest big money in information systems to provide them with up-to-date and integrated perpectives of their financial and competitive positions so that they know the state of health of their enterprise.

In this respect central government is no different. It needs to know the state of the national enterprise. It must have available up-to-date information about the country's economic performance, its population, its natural resources, wealth and the health of our living environment. It is a necessary condition for a flourishing nation that access to information be widely available.

At the present time the federal government is spending approximately $800 million per year and uses about 10,000 person years on developing this information from its major surveys. In the provinces we estimate that a further $125 million to $150 million per year is being spent.

All this is not to say that we need unlimited information. The challenge is to use effectively what we already have, and to be frugal about what we do in the future. We must avoid costly duplication of information gathering across the country.

The Major Surveys are divided into those that report on the socio-economic conditions of the country and those that describe the natural resources and environment conditions. Statistics Canada is the lead agency in the socio-economic surveys. The natural resources and environment surveys are fragmented over many government departments.

The task of the surveys is to collect information systematically and determine how things change over space and time. This information is costly to produce, and is in increasing demand as competition for the use of land and water between urban, agricultural, industrial and resource exploitation becomes increasingly more intense.

Traditionally, the major users of survey information have been government departments and agencies in their role as promoters and regulators of economic activity. Increasingly though, other sectors of Canadian life must have easy access to this information. The fact that only 15 per cent of capital formation in the country happens in government while 85 per cent of it happens in the private sector makes it clear that efficient access to our survey information has far-reaching benefits for the Canadian economy. Efficient access will speed decisions about the responsible exploitation of natural resources and exploration for new ones. It will help Canadians use and improve the transportation and communication systems, and to market their goods and services. It will also work to create an informed society.

Another characteristic of survey information is that its optimal use can only be realized when a substantial degree of integration between information on different subjects is achieved. For example, an evaluation of agricultural potential requires the analysis of soil capability, climatic characteristics, access to labour force and markets and knowledge about what agricultural land is already in production. A decision to open up or revitalize agricultural land will, among other things, depend on the self-sufficiency of our traditional customers in food production and the position of our competitors.

The application of computer technology to geographic information is proving invaluable in the management and analysis of the relationships between different subjects as well as the handling and processing of enormous quantities of basic data. Out of this is emerging a new branch of science and technology called Geomatics.

Provincial authorities require survey information for the management of natural resources, environmental protection, the development of transportation and communications, health care management and the management of the educational system. Recognizing this, provinces have begun the design of sophisticated geographic information systems, or as they are sometimes called, land related information systems.

To carry out its responsibilities in the areas of trade, regional economic development, international relations, interprovincial movement of goods and services, defence, etc., the federal government needs information similar to that used by the provinces but structured so as to emphasize the national perspective.

There is obviously great scope for sharing information, for avoiding duplication, and for involving the private sector in the support of the survey information requirements of all levels of government.

In summary, therefore, Major Surveys are programs that systematically capture information, store and analyze it, as well as package and disseminate it, through maps, tables and other graphic means. The information is critical to the government's ability to manage the country's resources, promote its prosperity and preserve the national health in the broadest terms.

It is in light of the above that we have reviewed the Major Survey activities. We have examined how:

a. to rationalize and minimize the overall cost of the capture, organization, storage, management, maintenance and dissemination of the official survey information of the federal government;
b. to bring a national perspective to what is being done and what needs to be done;
c. to promote access and circulation of the information; and
d. to promote a competitive Canadian private sector industry with leadership capabilities in the capture, organization, management, analysis, representation and dissemination of survey information.

The report provides individual assessments of the existing Major Surveys with specific proposals for immediate action for each. As well, it contains a number of theme papers and a set of associated options.

Above all we want to emphasize that there is an intimate relationship and interdependency of surveys in the federal and provincial arenas. Rationalization and cost reductions will result from taking a national rather than a federal-provincial perspective. We emphasize that our suggestions must be examined in conjunction with those of other teams of the Task Force on Program Review.

GOVERNMENTS AND THE PRIVATE SECTOR: A NEW ALIGNMENT OF RESPONSIBILITIES FOR NATIONAL SURVEY INFORMATION

Federal and provincial governments need similar survey information to fulfil their respective mandates.

Traditionally, they have focused on doing the work "in house", thereby creating and maintaining infrastructures which, in part at least, duplicate each other and the facilities of the private sector.

But survey taking can increasingly be carried out by the private sector.

Accordingly, the study team recommends to the Task Force that the federal government consider concentrating on the leadership and coordination role necessary to create an efficient and forward-looking National Survey System within which the private sector should be encouraged to assume a key role.

From the beginning of Confederation, constitutional responsibility for the effective development and efficient administration of Canada as a whole has rested upon the federal government.

This has required a broad range of information to illustrate the national perspective and permit regional comparisons for the purposes of balanced development and equitable administration.

The information needed includes: the definition and delineation of international and provincial boundaries; the size of the population and its demographic and socio-economic characteristics; the structure, geographic distribution and magnitude of economic activity; national inventories, and potential for exploitation, of natural resources; atmospheric and marine and hydrological conditions; and maps and charts for the safe movement of people and goods.

Provincial governments have had responsibilities for the management and use of their natural resources, for health and education, and for transportation and communications within their own boundaries.

They in turn have information requirements similar to those of the federal government, but characterized by greater detail.

Going beyond the immediate requirements of the various levels of government, the healthy functioning of our society and well-informed decision-making in the private sector depend upon the availability of this information to all Canadians.

The federal government has traditionally assumed that it must itself satisfy its own informational needs and has put in place extensive and frequently elaborate arrangements for doing so.

Entering somewhat later into the field of information-gathering some provinces were content to use existing federal survey mechanisms. Others, however, began to set up their own more advanced systems.

There thus exists, among governments, a national but uneven capability for conducting major surveys.

At the same time without any particular encouragement from government, a private sector data-gathering capability has developed in a wide variety of areas such as geodetic surveying, topographic surveys, geophysical and hydrographic surveys, remote sensing, and to some extent socio-economic surveys, soil and water surveys. There is also considerable capability in these firms to interpret and analyze the data.

The survey capability for meeting informational needs is thus formidable. But it cannot realize its full potential because of fragmented responsibility for surveys.

What is therefore needed is a new alignment of the overall capability based upon a full awareness of what the needs of the various participants are and the roles they are best qualified to play.

The essential federal interest is to get the information it needs, and to assure standards of quality, classification, etc., that make possible a national perspective. There should be no automatic presumption that it must of necessity itself collect the information it needs. Like any other partner in the system, the federal government should concentrate on what it is best, or uniquely, qualified to do: in this case giving leadership to the system as a whole.

On condition that there are demonstrated economies and that standards to meet federal requirements are guaranteed, the direct involvement of the federal government in data collection could be devolved to the provinces.

Provinces could then play a more direct and relevant role in the assessment of survey priorities, both national and provincial, in developing better integrated frameworks for satisfying needs, and in specifying appropriate classifications and quality standards. As well, they could be encouraged to take responsibility for the provincial components of national surveys.

Within such a robust framework of leadership and coordination, and knowing that it is assured of a meaningful role, the private sector can confidently be expected to provide technologically innovative and financially competitive inputs to the delivery of major survey information.

The necessary first step in bringing about such a situation is a commitment by the federal government to a new approach and a declaration of its intent to set up integrated mechanisms capable of administering all the federal surveys within a national perspective.

EFFICIENCY, COST CUTTING, AND DUPLICATION IN THE MAJOR SURVEYS

> It is the view of the study team that for costs to come down, the overheads in governments have to be reduced and the work needs to be done in a more competitive environment. New technology and new arrangements with the private sector offer the opportunity to do both.

Major survey managers have taken measures to avoid significant duplication between federal government departments and with provinces through Memoranda of Agreement or Co-operation. Therefore, the study team has not observed much duplication in the major surveys except in the use of capital equipment and the lack of sharing of observation networks. These are dealt with in the recommendations of individual surveys.

Major surveys seem generally well managed and documented. There seems to be adequate contact with and input from the user community.

There are some relatively modest short-term cost cutting opportunities without long-term harm to the surveys in the current interpretation of the national and federal need for survey information. In addition, substantial long-term cost reductions should be possible, by using the private sector more extensively in survey taking and information dissemination, and by making appropriate use of computer technology.

On the survey-taking side, the main long-range opportunities lie in avoiding duplication of capabilities in governments and the private sector; in rationalizing the federal government's operations; and, in putting the survey-taking in a competitive environment.

In the study team's opinion, the federal government, together with provinces should encourage creation of new decentralized data collection enterprises. Provinces would insist on the use of local labour and therefore this approach would be a far more constructive form of decentralization than through relocating an existing federal facility. The existing and very competitive topographical, hydrographic and geophysical survey industry could be encouraged to diversify into a multi-disciplinary mode. This in turn could become an exportable capability.

On the information dissemination side, making information more broadly accessible by marketing it through the private sector would be more cost effective. The argument against this is that the private sector would only stock those maps and information items that sell well and ignore the other parts of Canada. We are of the opinion, however, that with modern technology and acceptance that everybody can be served adequately, yet not necessarily equally fast, these objections can be overcome.

In Topographic Surveys and Resource Surveys the Province of Alberta is already following a policy of reliance on the private sector for survey taking and is now experimenting with the private sector to manage the data distribution system. Similarly, Ontario and Quebec employ only the private survey sector and have no in-house topographic facilities except for quality control and inspection. These provinces look however to Ottawa for R&D and technical leadership in these fields.

Experience in the U.S.A. and U.K. in a broad range of programs indicates possible cost reduction of 10 to 20 per cent through procurement from the competitive private sector. Applied to the major surveys expenditure this would be in the order of $50 - $100 million per year, while private sector involvement would create jobs locally, generate tax revenue and reduce the extent of governments' involvement in major surveys.

These actions would also bring surveys closer to the user. It would open up the survey information to more extensive value-added use by commercializing it, thus making the overall public investments more profitable.

Canada has always been quick to adapt and adopt new technology in its major surveys because of the magnitude and complexity of the task of surveying and mapping the people and resources of this country. A variety of Canadian techniques are successfully exported by the private sector.

In addition to the inevitable ground survey work, remote sensing techniques will continue to improve and add to the deluge of data to be managed. Again, data collection as such will no longer be the problem, but rather quality standards, and efficient data management to ensure that we do not drown in the data flows. Because it is technically possible, there is a tendency to collect almost everything and unscramble it later. Data collection should be more selective and processing will be correspondingly more efficient.

The processing power of the computer has given wholly new opportunities for analytical work of a sophistication impossible to ever contemplate before. This, however, imposes more stringent requirements to know and identify data quality.

Important opportunities with far-reaching effects on access and use of information are provided by linkage of computer technology with high-volume electronic communications networks. They offer the opportunity to decentralize the data collection and data dissemination processes.

After discussions in the provinces of Quebec, Alberta and Ontario, leaders in the field of land related information systems, and, considering the fragmented and ineffective R&D effort in the federal government, we see the need to create, in cooperation with provinces and industry, an R&D program in the area of automated data collection, organization, analysis, display and dissemination of survey information.

In examining the administration of major survey activities, we are concerned by the degree to which this sector has been audited and reviewed by both internal and external mechanisms. There is a perception among line managers that these audits and reviews consume a disproportionate amount of resources in relation to apparent benefits. Selective integration of survey operations may reduce the number of public servants taken up in monitoring. Also, use of competitive private resources may substitute for detailed assessment mechanisms, without destroying the effort to make government more efficient.

The necessary first step required to improve overall efficiency in bringing about a focus on data management, more active involvement of the private sector, and a concerted R&D effort in surveys, is a commitment by the federal government to a new and integrated approach to national surveys.

MAJOR SURVEYS AND INFORMATION DISSEMINATION

In the view of the study team, it should be explicitly recognized that there is a "public good" dimension to the dissemination of information; accordingly, prices should be limited to covering only the direct cost of access; there should be no charge to other users for the development of the data for government purposes and there should be no charge for costs of staff, operations and maintenance, or capital associated with operation of the access centre; copyright restrictions on secondary use of data should be loose; the benefit to the treasury will be forthcoming from personal and business taxes associated with the promotion of a more competitive private economy, not through the process of undisciplined revenue generation.

Observations carried out using sensors from space and aircraft, meters and monitoring devices in the water, and questions asked of households and business, are the starting points of information systems. Characteristically, the basic facts observed through these and other means are then combined analytically and scientifically by governments into information.

The information is then disseminated as maps and charts, as publications in printed and microfiche form, and in machine-readable form usable by computer technology.

Dissemination of information is thus part of a longer information chain.

Government requirements for increased revenue ("cost recovery") are leading many to recommend that increased shares of the costs of building up information should be included in developing prices for information that is disseminated. Further, there appear to be differences in the costs which are included as part of the publishing process among organizations that purportedly adhere to the same "full costing" principles.

There are emerging in government, differing pricing schedules for the dissemination of information in computer form which incorporate major costs of the information gathering process in the price. In some of the physical surveys, access to data in this modern form is already complicated because the delivery systems are not well developed. Both inhibit the private sector's adoption of modern computer-based management tools.

In our review we have been led to the principle that information developed as part of the process of government to serve the broader "public good" of an informed society should be widely distributed if our economy is to work well.

Further, since such information is a significant cost to business, the large price increases (some up to 500 per cent) which have been established for some publications in mid-1985 will be sufficient to eliminate profit margins in some, mainly small, businesses. These increases will raise the cost to all industry as compared to its competitors in the United States and elsewhere.

As well, we hear some people saying that business should pay while non-profit organizations and selected others should not, a thesis that is often justified on grounds that those uses are for special interest.

If a major chartered bank buys a copy of Statistics Canada's National Accounts or an exploration company purchases a map, is there no "public good" served by having all those who control 85 per cent of investment (and therefore, our future incomes and employment) being properly informed?

We share the government's concern about profligacy in government spending. Some of the printed information is subsidized, or made freely available. Of course, at times, a price is needed to deter capricious use of publications and maps.

We reject, however, the use of an administrative procedure (government pricing) that segments the cost of the information chain and therefore arbitrarily defines what is in the "public good", and thereby imposing a hidden tax.

Our view is that if the publication does not serve a public interest, then the information gathering by government can hardly be justified. In short, the more powerful route to the Treasury's "bottom line" should be through eliminating those surveys that do not serve the "public good", rather than through the nickels and dimes of revenue generation.

SCIENCE AND ITS RELATIONSHIPS TO MAJOR SURVEYS

Surveys need a national scientific research capability to support and maintain their relevance.

This capability exists, but lacks clear policy direction.

The science capability nationally would benefit from enhanced integration.

Therefore the study team recommends to the Task Force that the government consider theme-oriented scientific institutes financed by the participating 'shareholders' (federal-provincial governments, the private sector and universities) that would focus the effort and improve effectiveness and relevance.

Historically, the Major Survey activities grew out of reconnaissance surveys which gave a "first look" at the country's resource potential. Scientific research activities related to the surveys being conducted arose in geology, agriculture, fisheries and forestry in response to developing government policy. Thus, there resulted a federal government scientific research capability in institutions spread across several departments.

An important factor emerging from the review is that, in those survey departments having a scientific research sector, the national policies and objectives for the science are not always clearly articulated to management.

In the natural resources and environment fields scientific activities play a most important role. A scientific competence is needed in the conduct of the survey operations themselves to ensure their efficiency and effectiveness. For example, in recent years, the computer and automation have contributed to facilitating both the conduct of the surveys and the processing of large quantities of data which result.

Apart from this, scientific expertise is needed so that the surveys remain relevant to current issues. Here the role of scientific research is critical, for example, in the identification of new approaches to the discovery of minerals/ore bodies, etc., or for highlighting new contaminants of concern to Canadians. Progress in this research activity leads to modifications to ongoing survey activities.

Most of the survey activities which have been reviewed contain both types of science activities just described. Depending upon management approaches some survey activities seem to drive the science components while in others it is the scientific research component which has the higher profile. It is recognized that these latter scientific research capabilities are important national assets, not only in reference to surveys, but also in maintaining a national expertise in a rapidly changing technically and scientifically based society.

It is clear that, in the scientific research bodies, multi-disciplinary teams are more productive than single discipline units focusing on narrow themes. Scientists, however, are primarily motivated by peer recognition and their achievements are measured most often by publications in professional journals. This feature of scientific research can inhibit the formation of multi-disciplinary teams.

On the national survey scene there is a substantial and competent scientific research capability existing outside the federal government. The federal government performs (in terms of support) more than 60 per cent of the work, with the private sector and the universities contributing the remainder. It is the study team's view that Canada should take full advantage of all these existing capabilities to achieve its national objectives. Therefore, there should be more joint efforts on the part of the three major shareholders in the national scientific research effort related to Major Surveys. A series of broad theme-oriented scientific institutes would be a logical way of harnessing these human and financial resources.

A number of themes are already clearly identifiable in relation to national survey needs in the natural resources and environmental areas. These include (i) geological and geophysical sciences, (ii) ocean and atmospheric sciences, (iii) land resource use and evaluation, and (iv) water usage and evaluation. More closely related to day-to-day survey applications is a requirement for a science-based institution devoted to geomatics - i.e. the subject of automated data management, analysis, representation and dissemination.

Coupled with a clearly mandated and centrally managed surveys system in Canada, it is believed that the regrouping of present research activities into a series of science-based institutions centred on the above themes would ensure the government has the means to improve its management of the resource sector of the economy. The efficiency of the surveys would be improved through the development of strong links across the national scientific community and with the surveying system. The major survey activities would thus stay abreast of scientific/ technological change as well as emerging resource and environmental issues.

A strong national policy on surveys and scientific research in the natural resources and environment fields is a prerequisite to taking full advantage of our capabilities and the opportunities they offer.

ORGANIZATION AND PERFORMANCE

The success of the socio-economic surveys is the result of clarity of the federal responsibility to meet national requirements and of agreement in the economics area about the indicators that are needed to describe the economy and which define the surveys.

With the reconnaissance surveys being completed and provincial governments increasingly assuming responsibility for their natural resources and environment surveys, the federal responsibility to meet national requirements has become unclear.

Also there are no comparable widely-accepted arrays of indicators that allow the description of the health of our environment and natural resources. Hence the surveys cannot be clear as to what and how much to survey.

The clarification of national and federal policy in environment and natural resources, the resulting changes of focus in the surveys, the relationship between provinces, industry and academia, and the management of the application of new technology require attention and leadership from one Minister of Cabinet either through complete reorganization of the surveys or through some other effective means.

CONSIDERATIONS

There is a striking difference between the ways in which the economic surveys and the environmental and natural resources surveys are organized, how they receive their policy direction and set priorities.

In the economic surveys there is a clarity of mission which reflects directly on the way Statistics Canada as the lead agency in those surveys is organized and how other user departments, provinces and the private sector relate to it.

Statistics Canada has no difficulty in identifying its "core capacity, and competence" which must be maintained to carry out the responsibilities and tasks given to it in the Statistics Act.

It also has no difficulty pointing to some fundamental requirements of its surveys such as the need to assure the public of the confidentiality of the information, the reliability and objectivity of the results.

We believe the main reason for this is that, in these surveys, the national and federal role is clear and explicit. Also, in the economic area there is substantial agreement on the array of indicators that are needed to intelligently assess the health of the economy. Given the need for those indicators statisticians can design optimal surveys to obtain the data needed to an agreed-upon level of reliability.

In contrast, many of the environmental and natural resources surveys seem less certain of their missions and this comes to light, for example, in the numerous reorganizations affecting some of them in the last ten years.

Even in the surveys that form the foundation for all other surveys, i.e. geodetic, topographic and hydrographic surveys, there is a degree of indecision as to what should be done, at what rate and by whom.

Why is this so? There is the question of clarity of mission. Thirty to fifty years ago there was clarity of mission in the need to complete the reconnaissance surveys. The first inventory of the country's resources was for the purpose of knowing "the lay of the land" - its size and its shape. The surveys were done for economic development and sovereignty purposes. We needed to know where we could build roads, railroads and a telecommunications system. We needed to know hydro-electric power and mineral exploration potential, the forestry capability, agricultural potential, places to settle people, and, we had to assert our sovereignty of the Arctic archipelago.

The mission was clear: "Complete the reconnaissance surveys as rapidly as possible". As a consequence, departments organized accordingly, most prominently in the Department of Mines and Technical Surveys (Department of Energy, Mines and Resources). Even today, the National Resources and Technical Surveys Act is so broad that it can encompass almost any conceivable natural resource or environment survey.

Canadian scientists and surveyors in the environmental and natural resources surveys responded to the task with drive, innovation, and competence, substantially completing the reconnaissance surveys of 10 million square km in three decades. This earned them a world reputation.

However, now that we know where the northern tip of Ellesmere Island is, do we need to map it in more detail? Now that we know what the soil and land inventory is, do we need to survey it in more detail, as fast, and for the whole country? And should the federal government continue to do these detailed surveys or should it have a deliberate policy to divest itself from these tasks over say a four- or five-year period? Should it have a policy to help provinces to be responsible for these surveys recognizing that the federal interest is to have access to the information and that the information is capable of providing the national perspective? If the government were to affirm this position, it would increase clarity of mission, which would affect the organization of the surveys in a positive way.

We believe that the Forest Statistics "survey" is a model for this. The provinces maintain their Forest Resources Inventories. The federal government assembles this information into a national framework to be used in federal policy-making. There is no federal inventory taking. We ask why this model could not be applicable to other surveys such as the soil survey.

The above approach would not mean that national research institutes such as the Forest Research and Soil Research Institutes would need to be abandoned or that they would be less effective.

If the government were to take this position, provinces could be put on notice of the government's intent to phase out its operational involvement in such surveys over say a five-year period.

In the absence of such clarity in the federal position, there will continue to be in the environmental and natural resources areas, jurisdictional problems possibly with the exception of the meteorological surveys and the oceanographic surveys. But in land, fresh water, soil, air quality and topographic surveys there are overlaps and linkages.

The federal government to date, has responded with a loose policy of accommodation. This is based in part on its in-house expertise in surveys and to a degree on the unwillingness of some provinces to take on and pay for the task of detailed surveys. The activity is, however, not based on a clear understanding of the federal interest in survey information in terms of its constitutional responsibilities.

Increasingly, provinces now recognize that in the management of their environment and their resources they need integrated and more detailed "land-related information". Alberta, British Columbia, Ontario, Quebec and the Maritimes now have comprehensive plans to put in place such information systems and in some ways are well ahead of the federal government in this. Again this is because they have a clarity of mission which seems to be weak in the federal natural resources and environmental surveys.

We recognize that there has been definite action in individual surveys to solve the interrelationships between the federal and provincial levels of governments. The solutions are in many cases creative and constructive, but they tend to be improvised. And there is also confusion and uncertainty as to what to do next and how to avoid duplication.

Another reason for the apparent lack of direction in the survey departments stems from the fact that there are no generally accepted sets of indicators in the environment and natural resources field, similar to the economic indicators, and capable of giving us a "state of our living environment" or "state of our natural resources" description.

A recent conference organized by the Niagara Institute and including all interested parties of the environmental scene made observations relative to this point:

> "There is concern that our environment and our economy may be put at risk when decisions are made - or not made - based on inadequate, unintegrated, or uncoordinated information. There is also concern that information which is available is mistrusted because of doubts about the impartiality of the various sources of information."
>
> "There is particular need to develop good data on economy-environment linkages."

> "Perhaps most important of all is the need for data which is widely trusted in terms of relevance and reliability."

We, therefore, conclude that a task for the Minister of the Environment should be to see that a set of information or indicators is developed. These should be broadly accepted by the "stakeholders" and the surveys should be optimally designed to collect the data necessary to compute these indicators.

Similarly, the Ministers responsible for the various natural resources should articulate the information requirements to implement their policies.

It is our conviction that clarity of federal interest and a better articulation of the information requirements to meet environmental and natural resources responsibilities will significantly help focus the survey activities. It will determine the way in which the surveys must be organized. Without such direction it will be increasingly difficult to control the cost of the surveys in a rational and constructive way. It is likely that the expenditure trend noted in the Overview will continue.

As well, it is likely that duplication of technology and management and administrative complements could be avoided by amalgamation of some of the surveys.

In the interest of making the national survey system more efficient and responsive to national requirements we need to achieve clarity of federal survey policy, improve coordination with provinces; increase involvement of the private sector; shift the focus from survey taking to data management and dissemination; consider carefully the public good in pricing of survey information; redefine the role of scientific research activities; and, make survey information a visible resource.

This could be achieved in a number of ways.

OPTIONS

We have assessed four organizational options using these criteria. The study team recommends to the Task Force that the government consider these options, as summarized below:

Status Quo - The current organization includes a centralized organization of the socio-economic surveys and a highly fragmented arrangement of the physical surveys. There is little coordination between the former and the latter or among the physical surveys. The information function is the responsibility of at least five different ministers. In short, there is considerable duplication in operations and management.

In both areas, there are difficulties in resisting the temptation to develop information needs on the basis of internally developed science and analysis. This is especially a problem among the physical surveys where science and the information function are usually managed as one.

Again, in both areas, "revenue dependancy" considerations are driving up the price of access to information. This is especially true in the socio-economic area where dangerous precedents are being established, while among the physical surveys, access is inhibited by underdeveloped delivery systems. Co-operation with other governments and the private sector exists, but among the physical surveys especially, this is often weak and in many instances, provincial initiatives are in advance of those at the federal level. From the point of view of the federal treasury, this is welcome, but there are emerging dangers to the maintenance of national standards that are essential to between-province comparisons and operation of the nation.

Further, while there is evidence of increasing use of private resources in both survey areas, there is great resistance to its application and little understanding that this needs to be implemented as a device to reduce overall costs. Importantly, our investigation has found it difficult, especially among the physical surveys, to assess their respective performance.

Status Quo With External Advice - In this arrangement, we conceive of the development of a "National Survey Council" that would report to the Deputy Prime Minister and have the following terms of reference.

To report and make recommendations to government on:

- the overall efficiency of the national survey system;
- the participation and efficiency of the private sector involvement in the national survey system;
- the use of existing survey data and the need for new surveys, especially in terms of their suitability to determine:

a. the status of socio-economic factors affecting the nation;
b. changes in socio-economic conditions;
c. the status of the nation's natural resources; and
d. the status and changing conditions in environmental factors affecting our natural resources.

- the promotion of survey information and its commercialization;
- the effectiveness of mechanisms to obtain user input to program priorities;
- the extent of cooperation between the federal, provincial and private sector interests; and
- budget allocations of the federal and where feasible, national survey systems.

The membership of the National Surveys Council would be drawn from:

a. the national survey community;
b. the research community; and
c. others (e.g., the Science Council, the Economic Council of Canada).

The term of the mandate of NSC would be five years aster which its continued existence should be reviewed.

Additionally, develop the Canada Map Office as a Common Service Organization for printed materials, maps, and machine-readable information of the national resources and environment surveys.

This is the least disturbing option to current arrangements. While this could doubtless be configured and mandated to provide improvement in the deficiencies noted about the current arrangements, it would likely make only some progress in reducing duplication and reducing the extent to which science (as opposed to policy) determines what information is developed. As well, the advice of the Council could be easily rejected by Ministers endangering progress towards long-term objectives of information.

Consolidation of Major Surveys Under Three Ministers - In this organization, the socio-economic area would be arranged much as it is, but the physical surveys would be arranged into "Natural Resources" and "Environmental" areas reporting to two different ministers. The National Survey Council and the Common Service Organization developed in the option above would be maintained. This would considerably disturb current arrangements, but would provide some further gains in the form of reduced duplication, provide the basis for marshalling the resources needed to develop better systems of access, and make it easier to measure performance. At least four critical deficiencies would remain, however.

First, the excessive scientific domination of information requirements would be perpetuated since controlling ministries would have no incentive to separate the two functions. Second, "trust" of other governments and the private sector in the information generated would continue to be difficult, since the information function would necessarily be located in a department with policy and operational missions. Third, while concentration of the physical surveys in the departments with the largest "natural" needs would likely improve the relevance of information, there are substantial dangers that the needs of other departments that have legitimate information needs would receive insufficient attention. Finally, this arrangement would still create difficulties in national resource allocation in accordance with national survey priorities.

Consolidation of Major Surveys Under One Minister - In this, our preferred arrangement, all major surveys from both areas would be consolidated under one minister. The socio-economic, natural resources, and environment themes would provide the basis for the organization. Additionally, the science functions that are now integrated with the information function, would be devolved to theme-oriented science institutes. As this implies a significant devolution of resources from existing departments which would be left with policy and operational functions, it suggests that Fisheries and Agriculture would be combined, and Environment would be combined with other natural resource concerns to focus on economic development as well as environmental "damage" concerns. Acceptance of this proposal implies major dislocation of the status quo, but we think it is important to bring a $800 million expenditure program into the light where it can be inspected (and made responsive) on effectiveness and efficiency grounds. Further, separation of the information function from policy (as currently exists in the socio-economic area), is the only organization basis for establishing trust among those observed and those who use the information. There is a danger in this, however, which is that the proposed organization will dominate the country's information base. It will be critical to ensure that the system is operated openly. There should be strict limitations on the department's use of the data to provide "analysis" and interpretation. Formation of extensive, external advisory and review networks will help to ensure this.

Under any organizational arrangement, privacy of persons and confidentiality of corporate information must be safeguarded and be seen to be so.

Generally, the concern over protection of personal privacy and corporate confidentiality is warranted in the face of the use of increasingly sophisticated technologies for information processing and particularly with the powerful automated data matching searches on individual records which is now possible and sometimes efficient to avoid the expense of surveys. These matters are the subject of the "Privacy Act" and the "Access to Information Act".

PHASING

Our proposed organizational option will require major changes in the "culture" of existing organizations as well as a dislocation of current arrangements. Accordingly, there will be temptations to argue that this should be developed sequentially through each of the three proposed organizational changes. We strongly recommend against this, since it is almost certain that the process will stop at some intermediate point, having achieved only minor or modest gains.

ASSESSMENTS
SOCIO-ECONOMIC SURVEYS

Statistics Canada

OBJECTIVE

Statistics Canada is the dominant source of information used by the public and private sectors to describe Canadian social and economic institutions. It is not the sole source, however. Other Government of Canada organizations, the provinces, and private sources also provide such information.

Accordingly, Statistics Canada formulates its objectives as being:

- to provide statistical information and analysis on the social and economic life of Canada, to contribute to an understanding of the various aspects of Canada and provide a basis for the development, analysis and evaluation of social and economic policies and programs, for public, business, other private, and individual decision-making, and for the general benefit and information of Canadians; and
- to promote a national statistical program through the coordination of statistical activities of federal departments and agencies with the provinces and territories.

AUTHORITY

The Constitution Act specifically identifies the census and statistics as a federal responsibility. The Statistics Act is the principal legislative basis of the agency, but 26 other federal statutes require the agency to provide data for particular purposes (e.g., Federal-Provincial Fiscal Arrangements and Established Programs Financing Act, Corporations and Labour Unions Returns Act). For the most part, these refer to Census of Population and Gross National Product statistics and use of the Consumer Price Index. Approximately 30 per cent of resources are dedicated to these secondary statutory requirements. As well, Statistics Canada is the principal information source for data delivered by the Government of Canada to such international organizations as the International Monetary Fund, the Organization for Economic Cooperation and Development, and the United Nations. Finally, some activities are carried out under the aegis of federal-provincial formal and informal agreements, and the Constitution requires a decennial census of population.

BACKGROUND

History of Resources Allocated and Current Projections

As Figure 1 portrays, the real (after inflation) resources available to the agency to undertake its operations grew very rapidly in 1969-70 through 1974-75. They have, however, trended downward since Fiscal 1975-76 through 1985-86, with much of the decline concentrated at the end of the previous decade. The surge in expenditures in 1975-76 and 1981-82 reflects the large, additional resources necessary to undertake the Census of Population. Over the period 1975-76 through 1985-86, available real operational resources have declined by a cumulative 15 per cent, with decreases in salaries and wages falling slightly less (14 per cent), and purchases of goods and services falling by almost 19 per cent. The number of person-years in the agency's complement in this fiscal year is expected to approximately match that of 1980-81. Details are provided in Table 1.

Figure 1

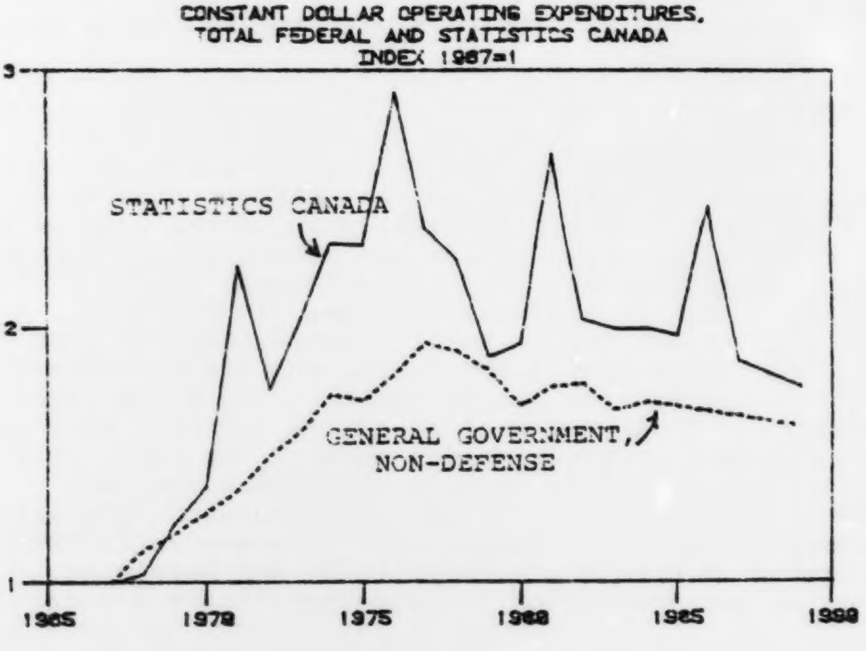


Table 1

BUDGETARY EXPENDITURES AND PERSON-YEAR UTILIZATION STATISTICS CANADA, 1981/82 TO 1985/86

($000s omitted)

Fiscal Year	1985/86	1984/85	1983/84	1982/83	1981/82
Personnel					
Salaries & Wages	144,426	139,551	132,856	125,320	122,119
Other Personnel	20,395	20,976	19,321	17,946	18,811
Total Personnel	164,821	160,527	152,177	143,266	140,930
Professional and Special Services	22,271	20,243	18,446	19,541	55,653
Other Operating	28,006	26,195	25,288	22,888	27,382
Sub-Total	215,098	206,965	195,911	185,695	223,965
Capital	890	9,390	4,954	3,947	7,424
Grants and Contributions	94	247	410	284	174
All Other Expenditures	12	12	12	19	8
Total Operating Expenditures	216,094	216,614	201,287	189,945	231,571
Less:					
Revenue Credited to the Vote	(8,424)	(8,538)	(11,702)	(9,862)	(9,198)
Total Net Expenditures Budget Year $	207,670	208,076	189,585	180,083	222,373
Total Net Expenditures Constant 1985 $	207,670	216,295	206,971	212,112	291,828
Conversion Factor	1.000	0.962	0.916	0.849	0.762
Person-Years	4,472	4,596	4,628	4,740	5,359
Revenue Credited to CRF (Budget Yr. $)	(1,486)	(1,080)	(1,401)	(1,517)	(886)

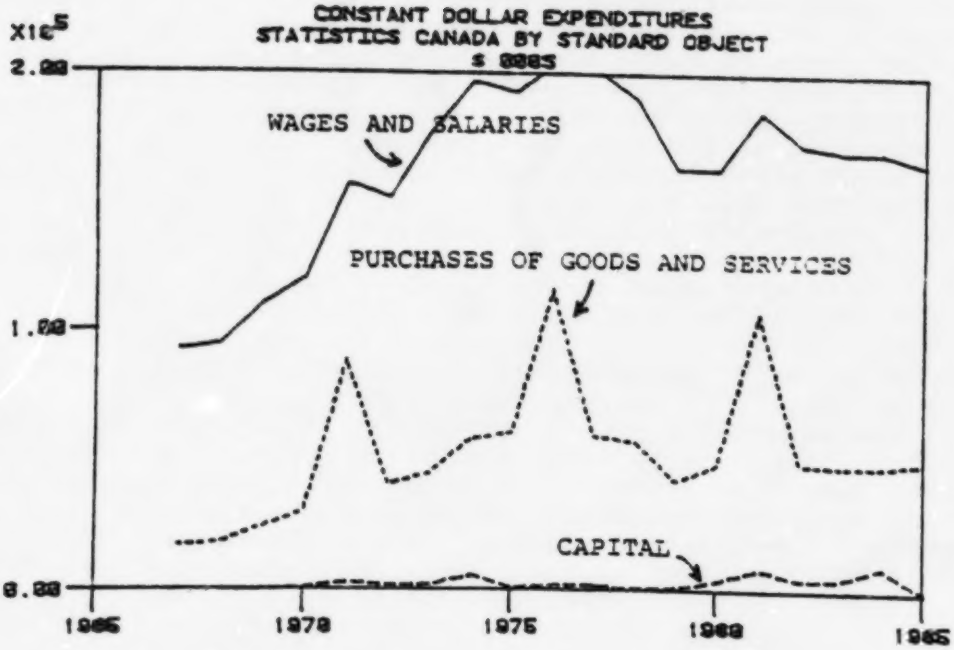
Operational Planning and Finance
June 24, 1985

During the same period (i.e., since 1975-76), general Government of Canada use of real (non-defence) resources has declined more slowly (by about 8 per cent, cumulatively). For the government as a whole and in contrast to the record at Statistics Canada, this general reduction has been achieved exclusively by reduced purchases of goods and services (about 40 per cent), while the real wage and salary category has increased by about 9 per cent.

Figure 2 displays the main expenditure items of Statistics Canada (in 1985 prices). Excluding the census year (1981), real operational resources available to the agency have remained approximately constant (at $215 million in 1985 prices) since a sharp downsizing was imposed in 1979. A little more than three-fourths of the agency's operational resources are accounted for by payments of wages and salaries to its fixed complement of personnel. Additionally, the agency spends about 10 per cent of its budget on purchased personnel services, mainly part-time interviewers ("Professional and Special Services" in Table 1). As Figure 1 portrays, the agency draws heavily on outside resources (mainly personnel) to fulfil Census of Population requirements. Notable increases in purchases of computing and other machinery occurred in 1980-81 through 1984-85 as the agency moved to substitute for labour resources and extended its regional network to satisfy local information needs and to regionalize its survey operations. Precise figures are unavailable, however, to indicate how much capital stock of this kind exists to support future operations.

For the future, Statistics Canada faces a round of downsizing given the effects of decisions on the 1986 Census of Population announced in the November 1984 Economic Statement, and the 6 per cent real reduction in Government of Canada spending announced in the May 23, 1985 budget. Taken together, these two decisions of the government suggest a further cumulative reduction in real resources of up to 14 per cent by the end of the decade. This would reduce the size of the real resources available to the agency to about the same as prevailed in 1972 (see Figure 1). The problem faced by Statistics Canada may be much more severe. To maintain the 1986 Census of Population, the agency has assumed that a change to full-cost pricing of its publications, machine-readable data, and user services and analysis will generate additional revenues of $35 million. This, with a commitment from CEIC of $30 million to support the census, implies only a $35 million loss of resources, which is spread over five

Figure 2



years. But, as the analysis in the following sections indicates, the cost-recovery decisions, while developed to maintain existing surveys, appear to follow costing practices that lead to higher prices than those used by the principal government publisher (DSS), impose costs on machine-readable access that discourages private sector adoption of computer-based and other management tools, and in general, significantly diminishes the "public good" dimension of information. If these practices are questioned and Statistics Canada is required to roll back some or all of its price increases and is required to cease or reduce its analytical operations, then some part of the $35 million in anticipated revenue will be lost, and the agency will have to either face additional reductions or seek relief of past decisions from the government. The elements of this problem are displayed in Table 2.

Table 2
Expenditure Reduction in 1990-91
(in millions of 1985-86 dollars)

November Census Reduction	7
May 23 Budget Cuts	23
Possible Revenue Roll-back	20

To put the question of downsizing in context, it should be first noted that information requirements of a modern industrial society are highly "leveraged" in the sense that the same kinds of facts are required regardless of the size of the economy and population. Thus, Canadian information expenditures are commonly thought to be about one-fifth the size of those of the United States, which has an economy that is ten times larger. But on these grounds, it is also true that one should not expect a centralized information utility would need to grow at the same rate, for example, as the economy. Growth of the economy and population do imply a need to observe more events in any given survey and to respond to a larger number of user requests. As well, increased interest in describing the economy in provincial (or smaller area) terms implies a need to increase sample sizes of surveys (i.e., record more events), and more complex treatment of policy issues (as in the case of health where the focus has shifted from health care to prevention implies recording of much more than hospital entries, kinds of diseases observed, etc.) may imply an increase of resources. Nevertheless, growth over the long term does not need to match that of the economy. Leverage considerations also suggest that the information utility's resource requirements would decline proportionately to the economy during periods of rapid growth, and would rise during economic downturns.

There is no correct single measure of increasing long term need, but if we assume that population growth is a rough approximation of this, then we estimate that resources available per unit of "need" declined by an average 3.7 per cent in 1975-76 through 1985-86, and will decline at most at about the same rate annually in the coming five years, assuming there is no roll-back of the census related price decisions and no major new information requirements. Put another way, these rates constitute the annual improvement in productivity that would be required by the agency to meet the society's information needs with the resources that have been or are scheduled to be available. The alternative is to eliminate or scale back some of the agency's missions or to increase cost recovery. Some combination of the two (reduced resource usage and reductions in missions met) is recommended.

ORGANIZATIONAL CONSIDERATIONS

General - While the United Kingdom and the United States provide notable exceptions, Canada, like most industrial countries, has tended to centralize its socio-economic information utility in a single agency. Several reasons lie behind this:

1. Ensure confidentiality of personal, business, and other private records to meet "privacy" provisions and to ensure appropriate response rates from those surveyed; more generally, to ensure that the nation's information is "trusted" because it is maintained by a "neutral" agent of society.
2. A large share of the resources required are driven by the central government's requirements to formulate stabilization, monetary, and sectoral policy.
3. Economize in the development and use of technical and management infrastructure and control response burden.
4. More easily control standards, definitions, integration of data, and documentation to ensure that there is a common understanding of what is being observed and reported.
5. Computing and communications technology of the 1960s and early 1970s was constructed around large, centralized processing units that facilitated a centralized development of information.

However, there are some "costs" to the benefits noted above, including:

1. The development and dissemination of data are at least once removed organizationally from policy and analytical uses by the public and private sectors. This inhibits the quick response of the data agency to changing needs (if protecting those needs that have been generally agreed to earlier). Large informal and formal networks of people are required to substitute for direct organizational links between the information utility and users. And finally, analysis is developed within the information utility, partly to identify emerging policy and analytical issues. All of this requires applications of public and private resources.
2. There is a propensity, through omission, of the information utility to "monopolize" information supply at both the data recording and data

dissemination ends of the information process, thereby possibly misallocating national resources through use of comparatively high-cost labour and other resources, and stifling (or prohibiting) innovation by others; self-assessment substitutes for competitive measures of value.

Additionally, it should be noted that although big computers and systems facilitated centralization earlier, this may no longer be a constraint as technologies that promote distributed processing may make it more efficient to collect and process data in smaller, decentralized organizations.

Program Description - Statistics Canada observes events through several censuses (of the population and some industries), more than 200 surveys, and through the use of administrative records. The latter include use of records obtained from the Department of National Revenue, the Unemployment Insurance Commission, and mainly provincial records that tabulate provincial and municipal finances, education, health, births, deaths, marriages, divorces and civil and criminal justice. Prospectively, the agency intends to extend its use of administrative records reporting Family Allowances and Old Age Security payments as well.

As a general description, these raw observations of Canadian economic and social activity are used (1) to satisfy constitutional and legislative requirements for a Census of Population, (2) to develop major accounting economic frameworks (e.g., the System of National Accounts, including Gross National Product, Input-Output tables, and the Financial Flow of Funds) that satisfy Government of Canada requirements for formulation of stabilization, monetary, and sectoral policy, (3) to report national indicators of social (health, education, etc.) status, and (4) to report on discrete areas of interest. This latter information ranges from reporting on the population, trade, balance of payments and many other areas of general public interest to reports that are mainly intended for narrow special concerns. The agency estimates that about three per cent of its budget is allocated to supplying such special (public and private) interests.

Information is disseminated regularly through a major publication program that ranges from a "daily" system that is widely used by the press and others to "alert" Canadians about current or recent activities through weekly, monthly, quarterly, annual and other less-frequent publications that provide detail needed by public and private analysts. Additionally, occasional surveys and publications produced by an analytical activity provide irregular publications. This activity takes place partly under an ongoing program of the agency and partly in response to the agency's status as a Common Service Policy organization. Information is also released in machine-readable form. This includes regular dissemination through the CANSIM system, which provides ready access to a large, single data base of "time series" that describe the changing nature of socio-economic activity and to "samples" of cross-sectional information, including the census of population. Subsets of CANSIM are distributed daily to 13 secondary, private distributors who make the data available in a variety of formats and provide a wide range of application software needed to tabulate, graph, and analyze the data. Additionally, the agency provides a large number of detailed, special data bases in machine-readable form on request, and provides a service to produce special tabulations (of, for example, the Census of Population) for those with no access to computing technology. Finally, the agency operates a User Advisory Service to provide telephone support for a large number of occasional enquiries; this is operated through nine regional offices spread across the country. It may be noted that the User Advisory Services constitutes a small component of these nine offices, whose allocation of some 350 person-years, is devoted primarily to data collection and data capture activities.

To manage, operate, and provide technical support for its data collection, processing, and dissemination, the agency is organized into four functional activities, a technical infrastructure, and corporate management. The four functional activities are:

1. International and Domestic Economic Statistics, including the major accounting frameworks noted above;
2. Socio-Economic Statistics, including prices, labour markets, sub-provincial data and family incomes and expenditures;
3. Census and Social Statistics, including those that focus on population, education and health status; and
4. Institution Statistics, including those that manage the country's health, education, culture, justice and public finance.

The technical infrastructure exists to manage the major dissemination systems, and to provide the essential quality controls needed for any statistical system. Elements of this include classification system (including a central business registry), statistical methods, and survey operations. Finally, the agency operates one of the largest centralized computing facilities in the country. Table 3, below, provides (from 1985-86 MYOP estimates) a representative view of resource allocation in non-census years.

Table 3

Allocation of Statistics Canada Activities
(measured as per cent of person year allocation)

International and Domestic Economic Statistics	29.2
Socio-Economic Statistics	14.7
Census and Social Statistics	11.8
Institution Statistics	7.6
Technical Infrastructure	27.3
Corporate Management	9.4

Ties to Clientele - Statistics Canada relies on a wide range of ties with its clientele. Reactions to publications and from User Advisory Services provide the agency with continuous feedback from its clientele. And recent moves to base the pricing of publications and CANSIM to full costs of printing and administering the data base (after the "manuscript") will provide the agency with a more price sensitive measure of demand for its products. What remains at issue is whether the costs underlying the pricing are based on an efficient use of resources (a contracting-out issue), whether some part of the activities should not be performed by the private sector (a privatization issue), and whether some elements of dissemination are in the public interest (a "public good" issue implying less than full-cost pricing).

Formal and informal networks also exist to tie the agency more closely to expressions of political and professional needs. These include a Federal-Provincial Consultative Council on Statistical Policy under which operate 20 committees focused on particular matters of interest, and a recently established set of User Advisory groups. The latter mechanisms extend earlier networks that have tied the agency to users of, for example the National Accounts, consumer and industry prices, and selected industry interests. Links with users have occasionally, as in the case of the Canadian Justice Centre, led to establishment of groups within Statistics Canada that operate under a strict federal-provincial mandate and joint management system. Beyond this, managers in the four functional areas have long-established, informal professional and academic ties. Indeed, it should be noted that a recent comprehensive audit undertaken by the Auditor General concluded that users were generally satisfied with the quality and relevance of the services of the agency.

Beyond the mechanisms cited above, the agency has a significant analytical program which is delivered through the Analytical Services Branch and in response to a Common Services role, it being argued that this provides the agency with:

- a mechanism for isolating (at a professional level of understanding) emerging issues of national importance with sufficient lead time to undertake the necessary development of data;
- a means of demonstrating analytical applications (and limitations) that can be undertaken with the data available;
- a mechanism for promoting and disseminating a better understanding of the data by focusing on data quality, concepts, methods, and classifications;
- a means of assessing the most effective ways of clarifying and tabulating the data which the organization collects and compiles; and
- a means of improving general agency "morale", it being assumed that limiting activities to data development alone will lead to the outflow of innovative managers and professional staff.

In this context, it may be noted that the agency now supports a significant number of person-years (216 in 1984-85) as a Common Service Policy agent. Somewhat less than half of this activity is designed to leverage obvious efficiencies in "piggy-backing" requirements; and a significant component is directed to tabulating data from confidential files. Nevertheless, parts of this program respond to analytical requirements that could be delivered by an existing private sector (commercial and academic) community and/or are based on "broad interest" criteria. While this may not be "significant" to Statistics Canada, it should be noted that the number of researchers in the four largest, private economic research organizations combined is well below 100 persons. Common Services work is carried out on a cost-recovery basis. Until recently, we understand that prices charged have not covered all costs. Not surprisingly, the agency was able to claim that the demand for such services consistently was greater than its ability to meet them. Nevertheless, the number of person-years covered has grown from 80 in 1980-81 to 216 in 1984-85. The agency has reviewed its basis for charging to ensure that full incremental costs are recovered.

Beyond these resources, the agency also employs (in 1985-86) 83 person years in an Analytical Studies program. These resources are used for a variety of purposes ranging from development of the basic economic accounting frameworks and exploratory work on new accounting systems to development of manuscripts that illustrate the utility of available data at the agency.

Recent Management Evaluations - Statistics Canada has been heavily scrutinized in recent years. These include a detailed management review undertaken by Price Waterhouse in 1980, and a review of the quality of the key National Accounts system undertaken by a senior international committee of experts headed by Claus Moser in 1980. The agency has also conducted a number of self-assessment reviews under the aegis of the IMPAC program, and was the subject of a comprehensive audit of the Auditor General in 1983. In this most recent review, some areas of concern were identified, but the Auditor General provided generally high marks in the areas of:

- data credibility;
- meeting user needs;
- co-operation of respondents; and
- securing confidentiality of responses.

With regard to management, the Auditor General identified "substantial opportunities to strengthen management control and reduce costs", and in general, the agency is judged to have responded positively to these criticisms. The recent, very large price increases for publications and dissemination of information in machine-readable form reflect this pressure. And the government's decision on May 23 to establish a National Statistics Council to help in setting priorities eliminates an outstanding irritant that had remained in effect until now.

ISSUES AND ASSESSMENT

General

Statistics Canada may be sitting on a time bomb. In response to the government's directive to maintain the 1986 Census of Population, the organization must achieve reductions in its permanent, non-cyclical resources of 3 to 4 per cent as compared to 1985-86 levels. Further, they expect to maintain other resources through large price increases in "products" and "services". But in some instances, the services appear to be an intrusion into private sector activity, represent activities that other Government of Canada departments regard as in their mandate, or are based on pricing strategies that appear to diminish the "public good" mission of delivering data in usable form to public and private decision-makers. As we indicate below, some element of these revenue gains could be lost and the organization may be required then to offset these by further reductions in real resources. Finally, decisions flowing from the May 23 budget, while not known to us in detail, are likely to cause an annual loss of up to another 10 per cent in resources over the coming five years.

The organization could attempt to meet these challenges through one or more mechanisms:

1. eliminate or diminish substantially their core missions, which include:
    - a. provision of the censuses of population;
    - b. provision of economic accounts that support stabilization, monetary, and sectoral policy formulation. It should be noted that in this, the agency supports federal missions that clearly are equivalent to national requirements; and
    - c. provision of social statistics on health, education, justice and culture; notwithstanding constitutional provisions, in these instances there is some ambiguity about whether the federal and national requirements are synonymous since the provinces have primary constitutional responsibility for delivering education and health services;

2. achieving large productivity gains through reorganization and reduction of corporate overhead, use of private resources that may be able to deliver equivalent inputs at a lower cost, introduction of internal competitive procedures, and speedier adoption of computing technologies that may yield productivity gains;

3. seeking relief from past or contemplated cuts; and

4. extending user-cost even further.

As the decision to undertake the 1986 Census of Population has been made, and as the 1991 Census is required by the Constitution and Statistics Act, few economies can be expected from this core activity. Further, many managers in the organization are skeptical that substantial gains can be made through item (2), and it would in any event require a substantial change in the "culture" of the organization. Finally, seeking relief from (item 3) past decisions would be difficult as the agency has already indicated that it can accommodate the 1986 Census. (And as best we can detect, further cost recovery can only damage an already diminished public good role of the institution.)

Accordingly, much of the downsizing focus could concentrate on reductions of the economic and social missions in the face of a sense among user communities that the qualities of data being reported have already been diminishing since 1979.

Managing the Details of Downsizing

It is a principal assessment that Statistics Canada, having been pressured since 1978 to develop proper management, has responded and is now a tightly managed agency of government. Accordingly, we conclude that Statistics Canada can manage the intricate task of determining which surveys and other activities are to be eliminated or reduced with least cost to given missions. But if the full downsizing is concentrated in these mission areas, it is almost certain that serious, perhaps major damage will occur to public and private decision-making in the economy, and possibly in health, education, justice and culture. Political and other repercussions would of course follow from this.

Analysis

Analytical Studies - The agency currently assigns close to 83 person-years to development of analytical studies. We are mindful of the benefits to the agency and statistical system of an internal analytical capacity, as is outlined in the Section on Organizational Considerations. Nevertheless, many observers question the need for such analysis when it is extended beyond research that is directed to assessing the quality of the data system developed by the agency. We have reviewed publications produced by this activity in recent years, and it is clear that some of the analysis is open to this criticism. In particular, the Structural Analysis and forecasting component of Analytical Studies are widely criticized in the private and public economic analysis communities. As well, the agency should consider other modalities, including secondment and interchange with other departments and private organizations, as a basis for linking data and analysis.

Common Service - A "right of first refusal" associated with the common services role of the agency may be legitimately founded on efficiencies associated with "piggy-backing" and/or on the need to maintain confidentiality. But the agency has indicated that other criteria, including service of general interest, may also be applied. These open-ended criteria, combined with the incentive constituted by funnelling revenues back into the agency's own treasury, have led to an explosive growth of the area, and some suspect that the organization is not playing on a "level playing field". Further, inspection of activities undertaken in recent years includes several activities for which the agency has no natural comparative advantage. While the agency has an explicit policy of referring to private sector suppliers when the work can be serviced effectively by them, it is clear that some of the activities actually carried out could otherwise be carried out by the private sector, and there are indications that pricing in practice is based as much on what the user can bear as on accounting of resources used. Indeed, the "right of first refusal", if applied, is a basis for dangerous, monopolizing intrusion into an otherwise competitive, private marketplace. It should be recognized that substantial reduction in delivery of Common Services policy analysis and services will not lead to a straightforward organizational decision since much of what is undertaken is provided from all elements of the organization, not a single, easily identified group.

Program Elimination or Reconfiguration

Health, Education, and Social Indicators - Delivery of the core economic frameworks serves an unambiguously national need in an area where there is little reason to believe that provinces or other orders of government judge that this is an intrusion into their mandates. Further, key federal Ministers, including those of Finance, Employment and Immigration and the Department of Regional Industrial Expansion, as well as the Governor of the Bank of Canada depend critically on the economic accounts. The agency, however, also has a constitutional and statutory mandate and a national role in developing health, education, justice, culture, language and other social statistics even though it is clear that provinces either have a lead constitutional mandate or are the principal program delivery vehicles. In these areas, there are coordinating vehicles in place, but the link to policy formulation and the political process is an administrative one only. Against this background, it should be noted that there are major changes in analytical perspective in the health area (from emphasis on health care to prevention) that are based on analytical concepts that are yet to be defined fully. This implies the need for a much larger set of survey resources, and consideration of developing alternative coordinating mechanisms in which the provinces and the Government of Canada would make "ownership" of the surveys (and the responsibility for payment) more direct. The Government of Canada may also wish to consider transferring some elements of the program to an independent agency with strict "sunset" provisions until the new analytical and policy perspectives are fully developed.

Surveys Intended Primarily for Special Interests - The agency has indicated that about 3 per cent of its resources are allocated to surveys and their tabulation that primarily serve private and other special interests. These should be continually monitored, and consideration should be given to either eliminating them (as they do not serve a "public good" role), or to charging for them at full cost, including, where applicable, the cost of designing and taking the surveys, the data development needed, and dissemination. In the latter event, no exercise of the "right of first refusal" should occur as a private sector capability exists or could be nurtured. We are led to believe that these principles are already in place.

Reallocation of Resources - In the area of serving requirements for sectoral analysis, Statistics Canada provides a comprehensive information system that allows full analysis of goods-producing industries. Thus, it is possible to simultaneously analyze their demands, supply, and wage and price formation. The same cannot be said for analysis of services sectors, which provide about two-thirds of Canada's employment. Accordingly, consideration of reducing the frequency of some surveys in the goods area (e.g., the Census of Manufacturers) should be made; resources freed could be used to develop badly needed surveys of the services sectors. It should be emphasized that this should be considered only after careful review. Eliminating the requirement to produce small area estimates of the Consumer Price Index, which does not vary significantly from the national pattern over the longer term, may also free resources. We have also considered reducing the frequency of the Labour Force Survey from a monthly to a quarterly basis. This would yield substantial cost reductions, but we judge that there is currently no alternative. Further, absence of monthly estimates would doubtless alienate organized labour significantly, and is an important input into stabilization policy. Finally, consideration should be given to elimination of the Capital Investment Intentions Survey conducted by the Department of Regional Industrial Expansion, with resource savings from there possibly reallocated to Statistics Canada's development of investment data.

The small area data program, which is scheduled to be reduced from 25 to 12 person-years in the next fiscal year, will have a questionable mission since the Government of Canada has moved in development of regional policy from a mode of intervening in provincial and private investment decisions on a small area basis to setting frameworks only. A notable exception to this is in the area of labour markets, where CEIC's focus is on small areas. Resources could be moved to development of a more complete set of provincial accounts, which are currently underdeveloped.

Competitiveness

External - Approximately one-half of the permanent personnel resources available to the organization are dedicated to designing, taking, and otherwise processing the basic surveys and censuses. Statistics Canada is developing plans to encourage more efficient use of these resources. But other options may also be viable. It is argued by most in the organization that internalizing this is essential to maintain confidentiality of the data sources (an essential ingredient of "trust" in the organization), and that they are the most efficient at this in the country. But some of the surveys do not observe confidential data, and the organization does not systematically use market tests of its efficiency. We judge that this and other less well-defined barriers are used too much to substantiate agency activities and to limit the private sector. The judgement of Statistics Canada that it is most efficient may flow from the fact that insufficient effort has been made by the organization to foster an outside survey design and taking capacity; indeed, it may be argued that internalizing the activity has forestalled the development of such an outside delivery capability. Given the existence of such an industry, the way markets work in competitive environments, the likelihood that wage rates would be lower, and the likelihood that corporate management would be smaller, it is possible that substantial expenditure reductions could be achieved. Responsibility for confidentiality should remain with Statistics Canada if some elements of survey design and taking are contracted out, and mechanisms for ensuring this would have to be established. Additionally, private access to non-confidential parts of the elements of the agency's technical infrastructure (including, the Business Register and application software) should be made available where this is not already the case on a marginal cost basis (since it was developed to meet "public good" requirements) to ensure a "level playing field" between agency resources and potential private resources. It should be noted that this will provide some competition to established private producers, however, and will require changes to legislation (the Tax Act).

With respect to CANSIM, which has moved to full cost pricing from the point at which data are provided to the delivery mechanism, and may be terminated if revenue targets are not met within three years, alternatives to the pricing strategy should be explored. It should be recognized that there are substantial "public good" dimensions to this activity, including ready development in the public and private sector of quantitative analytical techniques and potential for other Government of Canada departments to minimize publication costs of their own analysis. To argue that costs should be counted from the point of dissemination is equivalent to arguing that the "public good" of defence exists in the planning of strategy and purchase of tanks, guns, and planes, but that citizens should be charged when they are used to contain rebellion in a particular area or to defend the country from assault by a foreign power. In the absence of this reconsideration, it should be recognized that government is operating a "business" for which there are large numbers of alternative suppliers already in place, but if this alternative is chosen, there is a substantial danger that the activity will be developed as a private monopoly. And if current practice is continued, there is a better than even chance that the activity will not meet its targets. In this event, the activity will cease or be privately monopolized. As well, consideration should also be given to dropping the copyright provisions of CANSIM data as this has forced the development of a secondary distribution system that requires all distributors to carry an overhead of data that is often not required by end users. Direct access to the "main base" by secondary distributors would be a more rational form of organization.

Internal - In some degree, provision of computing resources within the agency has been provided as a "free" service to internal users. In these circumstances, it is not surprising to find some dissatisfaction with the service provided. The agency is moving to provide "hard dollars" to internal users for purchase of computer cycles, which decision should lead to a more rational basis for "testing" allocation of computer cycles. It will be important in this context that procedures are in place to ensure that other artificial barriers are not constructed to limit within-Statistics Canada user choice. No decision has been made to develop a similar program for use of programming resources, yet there are more than 100 person-years allocated to maintenance of internal application programs. We are not in a position to judge the value of these resources, apart from the obvious fact that they are crucial in such a highly automated institution, but we are suspicious of the level of the need. Accordingly, we suggest consideration of the development of an internal competitive "market", in which the internal programming resources are broken into perhaps three groups that compete for business of the internal users. In such an environment, users within Statistics Canada would request proposals from the three competing suppliers annually, and following defence procurement practices in the U.S., would be awarded to each of the three groups in descending proportions (say, 45, 35, and 25 per cent). This ensures maintenance of competing supply, but rewards good management. Alternative, "hard dollars" may be provided to end users in the organization to purchase their software support from private as well as agency resources.

Provision of "hard dollars" to internal end users may lead to a substantial loss of "business" for the internal computing centre. This makes the development of a strategy based on modern distributed processing techniques imperative.

Coordination of the Statistical System

In the Statistics Act, the agency is mandated "to promote and develop integrated social and economic statistics pertaining to the whole of Canada and to each of the provinces thereof and to coordinate plans for the integration of such statistics". A group exists in Statistics Canada to promote coordination of surveys and statistical standards in the Government of Canada. Principles of its operations are currently under review with Treasury Board and need to be brought to a conclusion. Consideration should be given to increasing this group's resources, and to moving it out of Statistics Canada if the Major Surveys Team concludes that new, integrating mechanisms or institutions are needed for the physical surveys. This would shift Statistics Canada from the position of being both "referee" and "player". Also, if new mechanisms are decided on, relevant aspects (the general development work) of the geo-cartographic systems and possibly, structural analysis and the small area data program functions should be moved to the new, physical survey institution(s). Among other benefits, this will establish information ties between the physical and "socio-economic" information systems.

Pricing of User Advisory Services

As user advisory support is not now significantly charged for, there is evidence of demand which exceeds the ability of the agency to respond to requests. It has been suggested that a separate, costed advisory service should be established. This should only be established if it can be assured that resources will not concentrate in the "for pay" queue. In any event, there is an established "advisory service" industry in Canada, and it is not clear that another new "business" should be established by the agency. On the other hand, there seems to be little opportunity to privatize the small, existing capacity.

SOCIO-ECONOMIC SURVEYS

Labour Canada

OBJECTIVES

The Department formulates its objectives as:

a. to promote and sustain stable industrial relations, as fair return for efforts in the workplace, and a working environment conducive to physical and social well-being;

b. to protect the rights and interests of the parties involved in the world of work;

c. to promote equitable access to employment opportunities; and

d. to foster a climate for improved consultation and communication among government, labour and management.

AUTHORITY

The mandate of the Labour Canada program is derived from the Department of Labour Act and the Canada Labour Code consisting of Labour Standards (Part III), Occupational Safety and Health (Part IV), and Industrial Relations (Part V), as well as the Fair Wages and Hours of Labour Act, the Government Employees Compensation Act, the Merchant Seamen Compensation Act and the Labour Adjustment Benefits Act.

DESCRIPTION

The Department of Labour was established in 1901 and from the outset, its establishing Act has given it a mandate to collect and disseminate data on the labour characteristics. This is being carried out by Labour Data Branch. The Wages and Working Conditions Survey (WWCS) became annual in 1921. It is a voluntary survey conducted by means of a mailed survey of employers in establishments with 20 or more employees in all sectors except construction and several primary industries.

The Department also maintains on an ongoing basis a Collective Agreement Collection, but because of its nature it does not fall into the scope of our team's work.

On occasion, other surveys may be conducted to investigate a specific problem. Very few may recur and, where possible, Labour Canada intends to privatize them (e.g. Industrial Relations Research in Canada - conducted last in 1980-81 in case there is any request for it).

The Survey of Wages and Working Conditions

The Surveys Division carries out an annual survey (in October) of occupational wage rates, standard hours of work and certain other working conditions. This survey is the only national source of wage rate statistics by occupation, industry and geography which are used for business, plant location and manpower studies at the regional and sectoral levels.

The survey provides statistical and analytical information on labour characteristics concerning average wage rates, salaries and hours of work for up to 700 non-professional occupations in most major industrial areas classified by 90 community groups, size of establishment measured by number of employees, union and non-union categories and sex.

In addition, the survey collects information on working conditions related to hours of work, paid holidays and vacations and, on occasion, gathers information on pension plans, employment of handicapped workers, educational leave and maternity leave.

The Surveys Division sends out about 30,000 questionnaires each year to businesses and receives about 16,000 returns, a 53 per cent return rate. In cooperation with Statistics Canada, means of increasing the response rate are being identified and implemented.

Statistics on wages and standard hours of work are published for 22 large communities and their total for Canada. Unpublished statistics as well as data in machine-readable form for other communities are available on request.

The Department has cooperative arrangements with the provinces of Alberta and Saskatchewan for those provinces to administer the survey in the two provinces as part of wider provincial surveys. The resulting information is integrated into the national statistics. Labour Canada pays, under contract, a share of the cost of conducting these surveys.

BENEFICIARIES

The number of requests or enquiries received directly by the Surveys Division for information from WWCS totals about 1,000 per year. Of the 1,000 requests received, 47 per cent are from business users and half of these are from smaller companies. The vast majority of the enquiries originate from the business community as opposed to the trade unions. Union users of the WWCS represent about 5 per cent of the total. The Industrial Relations Information Service within the department also uses the survey results. The sale of the Wage Rates, Salaries and Hours of Labour publication by the Department of Supply and Services (DSS) number 7,328 as of December 4, 1984 for the 1983 issue. The department also provides the data in machine-readable form (tape) and charges its clients the copying cost.

Other users included:

- Provincial governments, economists and policy advisors use the data for compensation determination to answer public enquiries about appropriate levels of pay by occupation and community and for policy development;
- Municipal and regional administrations mainly for comparison between locations to assist prospective investors;
- The federal government in several of its departments outside of Labour Canada. Treasury Board is a major user of the data in relating public service pay scales to those in the private sector. Employment and Immigration Canada in its regional offices for adjudication of unemployment insurance claims; and
- Lawyers in workers' compensation, unemployment insurance and accident insurance claims.

OBSERVATIONS

An external evaluation conducted by ABT Associates of Canada concluded that the WWCS data:

- are used mainly by large firms; trade unions are using them less, because the lower-paid non-union sector is included in the sample;
- are useful to trade unions for wage rate comparisons on a provincial basis; and
- are considered by some firms to be too general, of poor quality, and published too late (up to one year for complete results).

WWCS is the only nation-wide survey of union and non-union workers. Most other occupational information is collected by special interest groups or private companies, either for their own use, or on commission from large companies.

In 1984, an independent program evaluation was done by ABT Associates of Canada. Based on it, and on suggestions contained in the 1982-83 Auditor General's Report, several activities were initiated:

a. In November 1984, a Labour Canada - Statistics Canada Committee was established and launched a study of the WWCS.

   The Feasibility Study confirmed by the Cabinet, and due in August 1985 should also recommend whether it would be cost beneficial to transfer the survey operations to Statistics Canada.

   The methodology, which has not been changed significantly for 30 years, will have to be reviewed.

b. Labour Canada implemented the Auditor General's recommendations to inform users about data quality, applicability and limitations. After consultation with Statistics Canada, explanatory notes were revised, expanded and published with the 1983 information.

c. Labour Canada monitors user needs in regular consultations with the Treasury Board Committee, the Public Service Alliance Canada (PSAC) and the Pay Research Bureau (PRB). It maintains also close links with provinces through the Canadian Association of Administrators of Labour Legislation (CAALL).

RESOURCES ($000)

Program LC 24 - Surveys Division (Wages and Working Conditions Survey, Central Analytical Services).

	81/82	82/83	83/84	84/85	85/86
Personnel (sal. & wages & other personnel)	825	904	693	786	747
Capital	--	--	5	6	--
Other Operating	195	195	220	261	228
Person-Years	21	23	20	20	19

ASSESSMENT

The department conducts surveys and other collections of labour data; this represents only a small part of its activities. The department is aware of its shortcomings in the level of response for the Wages and Working Conditions Survey and either already did, or is in a process of, implementing corrective measures wherever resources permit. It also has in place a proper mechanism for being more responsive to changed in occupational mix than it was in the past. Recent improvements can be seen in the following areas:

- a mechanism for the coordination of feedback on surveys is in place and is functioning well;
- in support of information, proper data interpretation is being published with the data;
- alternatives for producing data are to be identified shortly.

The department is aware of its shortcomings in the area of data analysis. In recent years, the number of analysts (ES category) declined (from 17 ES in February 1972 to 7 ES at present) in the Labour Data Branch.

A quality control system is in place to validate returns, however, alternatives for checking and controlling response rates have to be considered either as a part of the Feasibility Study due in August 1985, or as a separate topic on the agenda of the Labour Canada-Statistics Canada Committee.

While there exist other sources of compensation data, WWCS is the only vehicle which systematically provides the detailed occupational and geographical breakdown of the WWCS and therefore should be maintained.

Data collection for the WWCS has to be done by an agency that the trade unions perceive as being objective and unbiased. If a private company were to collect the data (even on behalf of the federal government), the unions would mistrust the information and either be forced to check it through an independent study, which would reduce its usefulness in negotiations. This consideration does not exclude the possibility that data collection could be conducted by another government agency, e.g. Statistics Canada, if it is less costly and more efficient.

Very little data analysis beyond data quality control (e.g. trend analysis) is done. This is caused by recent cuts that occurred mainly in the ES category.

WWCS is a survey with many uses and may be expanded to cover other purposes, however, these expanded and future uses require the redesign of the methodology. A more in-depth analysis of occupational data requirements of clients will be needed to assess the effectiveness of the existing survey in meeting those requirements.

Statistics Canada, subject to the results of the Feasibility Study, seems best suited to maintain the survey frame, control response rates and collect the information through its existing infrastructure.

SOCIO-ECONOMIC SURVEYS

National Health and Welfare (NHW)

OBJECTIVES

The Department is vested with responsibility for promotion and protection of physical, mental and social well-being of the population.

Among its many varied activities, two programs perform major collection, processing and distribution of data. This study describes these programs, namely, HWC 41-Welfare Management Information System (MIS), and HWC 103-National Health Surveillance.

AUTHORITY

For National Health Surveillance, the Department of NHW Act provides a general mandate to investigate and research the problems of health and welfare and, more specifically, subject to the Statistics Act, collect, publish and distribute information relating to the public health, improved sanitation and social and industrial conditions affecting health. Cooperation with provincial authorities is required for preserving and improving public health.

For Welfare MIS, the Department of NHW Act provides general authority to such a MIS. The Canada Assistance Plan (CAP) 1966-67 provides for exchange between Canada and provinces of statistical and other information regarding operation of the Act; it also requires that the provinces maintain records and accounts regarding CAP payments. While all the actions under CAP are compulsory, the agent carrying out the action is not specified. Canada is required in return to make available statistical and other reports and studies concerning CAP. The Vocational Rehabilitation of Disabled Persons Act 1960-61 allows the Minister to collect, compile, analyze, abstract and publish information related to this area.

DESCRIPTION

National Health Surveillance

The department collects data mainly for policy development and management purposes, and subsequently analyzes them; it is not involved in survey design.

The surveys are designed by Statistics Canada. There is a close co-operation between the two departments, and neither of them has a complete responsibility for health and welfare data collection and processing.

Responsibilities for federal information systems in the health surveillance field are split between Statistics Canada and Health and Welfare as a result of many decisions over several years. The Canada Health Act does not provide a clear division of responsibilities.

Statistics Canada collects and publishes information on health institutions (primarily hospitals), vital statistics, certain illnesses, a limited subset of health, manpower and certain social programs.

Health and Welfare (i.e., Policy Planning and Information (PPI), in collaboration with Health Service and Promotion Branch) provides resources to obtain and analyze information on:

- medical care services;
- national health expenditures;
- federal health contributions;
- some aspects of health institutions (e.g., user charges);
- physician manpower and incomes;
- certain illnesses; and
- certain surveys (e.g., Canada Health Survey).

In addition, the Health Protection Branch maintains a wide range of information systems dealing with food, drugs, illnesses, etc.

One of the major information systems in PPI is dealing with medical care services; detailed data are obtained from the provinces and are used to generate reports, some of which are published while others have restricted circulation (e.g., provinces, federal government, professional associations); the reports cover such topics as:

- the number and costs of physicians' services;
- physicians' fee payment schedules; and
- the number and distribution of physicians.

Many of these systems are associated, both directly and indirectly, with information requirements arising out of the Canada Health Act.

With respect to national health expenditures, a report is published periodically by the Branch providing information on health spending by category, province and sector, with comparable U.S. information.

Various other data bases are maintained on federal health contributions, health institutions, physician manpower and incomes, etc. Reports are produced using these data bases.

Resources (i.e., people and/or money) are also provided to support such systems as the now discontinued Canada Health Survey; the Renal Failure Register; etc.

Welfare Management Information System

The division of responsibilities for federal information systems in the welfare field is split along program/survey lines.

The department maintains systems on program statistics while Statistics Canada is mainly responsible for national surveys in this regard. Information systems maintained by the PPI Branch include:

- Family Allowance Statistics;
- Old Age Supplement/Guaranteed Income Supplement Statistics;
- Social Assistance programs (descriptions and statistics);
- various other federal and provincial social programs (mainly descriptions);
- Canada Pension Plan statistics;
- certain income tax statistics;
- various surveys (e.g., Survey of Consumer Finances); and
- certain institutional information

These systems are used to generate reports which are provided to departmental officials, to provinces, and to respond to specific requests; there are currently few widely distributed publications in this area.

The Family Allowance and Old Age/Guaranteed Income Supplement statistics provide information at the postal code level which is particularly useful in supporting the

Constituency Reports and requests from provincial and municipal officials for school and hospital planning purposes.

The Branch also administers Welfare MIS-Contributions Program.

Social Security Programs

Various demands also exist with respect to broad-based statistics on social security programs.

While Statistics Canada does provide some information in this area, the bulk of these demands have been met through the development of systems within the PPI Branch including:

- social security statistics (expenditures, recipients and other statistics); and
- departmental expenditures by constituency.

The social security statistics system provides annual time-series, by province, on a wide range of social security programs in the health and welfare fields.

RESOURCES

The resources used for collection, processing and dissemination of the data within HWC 41-Welfare MIS and HWC 103-National Health Surveillance cannot be easily separated from the operational and policy budgets.

Since the Information Systems Directorate within PPI performs the processing and dissemination of health and welfare information in NHW, its budget is quoted below:

Information Systems Directorate
Resource Summary
1981-82 to 1985-86

	81/82	82/83	83/84	84/85	85/86
Person years	65	69	69	70	70
Operating Costs	893	1,143	1,124	1,125	996.4
Contributions (Information Systems Development Program)	2,070	2,420	2,270	2,420	1,770

BENEFICIARIES

All levels of federal and provincial governments for policy, planning, operation and monitoring purposes; professional associations, insurance companies, researchers, international agencies (e.g., OECD).

ASSESSMENT

The relation as it exists now in health surveillance area among:

- federal department of Health and Welfare,
- provincial health departments ("provinces" in further text), and
- Statistics Canada,

permits representation of all important resource organizations for health statistics. At the same time, it makes any new decisions and initiatives difficult to implement mainly because responsibility of participants is not clearly defined and therefore the leadership is not strong enough. The relation is also fragile and may easily degenerate. While the cooperation between National Health and Welfare and Statistics Canada has been good and successful for many years, that between NHW and provinces suffers from many problems. Yet the involvement of the provinces is essential to the good functioning of the programs. Provinces recently expressed their interest in, and intended increased support of, a system of national (as opposed to federal) health statistics.

There is already in place a federal-provincial committee on health information which, over the past eight years or so, has successfully guided the development of a national health information system.

SOCIO-ECONOMIC SURVEYS

Revenue Canada, Taxation

OBJECTIVES

The primary objective of the RCT Department is collection of taxes. As a by-product of the process, administrative records are created. These are used for statistical purposes and, therefore, fall into the sphere of analysis performed by our team.

AUTHORITY

The Department of National Revenue Act makes no specific reference to information or data collection.

The Income Tax Act requires "any class of persons to make information returns and supply a copy,....and provide additional information upon request".

The information thus collected may be released for use in criminal proceedings and in relation to the administration of the Act. Specific mentioning of secondary, statistical use of the information appears in the Statistics Act.

DESCRIPTION

There exist two tax forms:

T1	for individual tax return (employees and self-employed persons, i.e. unincorporated business);
T2	for corporate tax returns; and PD - Payroll Deduction data from forms filled in by employers. Statistics Canada has a special arrangement with RCT under which RCT provides its data in machine-readable form as well as hard copies for additional coding and transcription.

The advantage of using such data for statistical purposes lies in its ready availability (as a by-product of the main RCT activity). The disavantages are the following:

- the data are filled out only by taxpayers, i.e. do not cover the entire population;

- the data from T1 and T2 are available in the final form up to 24 months after year-end; those from PD six to eight months after being filled in; and
- the data are collected for purposes other than statistical, and do not always appear in the form or use a definition most useful to statisticians.

In recent years, there has been a trend towards replacing or complementing statistical data by administrative records.

Statistics Canada keeps close contact with RCT through a Steering Committee, through joint Information Committee, as well as day-to-day contacts.

RCT was largely responsive to Statistics Canada's requirements to add questions to the tax return form, to reformulate their wording or to modify the definition of a certain data item or to change the design of the tax return form, and the cooperation between the two departments has been good.

RTC finds it difficult to accommodate all Statistics Canada needs for the following reasons:

1. Each change of tax form design has to be such as to minimize additional burden on respondents.
2. No special resources were reserved for the work done to accommodate Statistics Canada requirements, and this type of work is not among the RTC's priorities or main objectives.

RCT processes both corporate and non-corporate returns, producing tax-oriented statistical tabulations for national and regional levels.

Statistics Canada processes corporation returns for financially-oriented information (financial and taxation statements). This processing was originally done at RCT (till 1964).

Often, users of the data cannot obtain certain statistics on corporations from Statistics Canada, and refer to RCT to obtain the answer to their request.

Sampling of self-employed T1 returns is done mainly by RCT. Statistics Canada does a very small supplementary sampling of unincorporated business, but it is not significant in size and should not be viewed as duplication. Probably not much improvement could be accomplished in this area.

Cross-referencing between Payroll Deduction and T2 is desirable as a proxy to, or complement of, data collected by Statistics Canada.

Matching of the two files is not simple, it can be done only for a part of both files (with problems and for additional cost), i.e. there may be several payrolls for one corporation.

The forms were designed without provision for matching and, therefore, are not suited for it. RCT is generally interested in matching the two files, but this is not among its priorities.

BENEFICIARIES

Department of Finance uses the statistics compiled by RCT for its decision-making. Statistics Canada uses the data from tax returns and payroll deductions for financial statistics and in the Business Register. Thanks to these data, certain separate surveys need not be taken and the quality of the Business Register (the base of all business surveys) has already improved and will improve further.

OBSERVATIONS

Administrative data keep growing in importance as valuable sources for statistical data.

Since they are not collected primarily for statistical purposes, their statistical reliability cannot be estimated. There is no typical administrative file, therefore, it is difficult to generalize where each case is somewhat different. In spite of all that, more theoretical work is needed to identify limits of administrative data use and to prepare a solid ground (beyond mere intuition) for its ever-growing use.

ASSESSMENT

Administrative data created in the process of tax collection have been used for secondary statistical purposes for over two decades. With the increased appreciation of administrative data value for statistical purposes, more theoretical work is needed to identify limits of their use and to prepare a solid ground for their optimal exploitation.

Statistics Canada has a legitimate interest to influence the tax form design. RCT, while being cooperative and helpful in accommodating requirements of Statistics Canada for access to their data, has different priorities and no resources assigned specifically to deal with such requirements.

ENVIRONMENT AND NATURAL RESOURCES SURVEYS

WEATHER SERVICES

Environment Canada

OBJECTIVES

To provide present and predicted weather and sea state data and advice to be used for the safety of Canadians, the security of their property, the support of economic and social activities and the protection of the environment, and to acquire the basic understanding of atmospheric properties and behaviour needed to maintain and enhance such services.

AUTHORITY

The Government Organization Act of 1979 assigns to the Minister of the Environment explicit responsibility for meteorology, and also directs that the Minister shall "initiate, recommend and undertake programs and co-ordinate programs of the Government of Canada that are designed ... to provide to Canadians environmental information in the public interest".

Responsibilities also derived from commitments to cooperative international programs.

DESCRIPTION

Weather Services is the largest of a group of closely integrated sub-activities within the Atmospheric Environment Service (AES) activity of Environment Canada, currently accounting for approximately 70 per cent of the AES's gross expenditures. Organizationally, it comprises major elements of the Field Services Directorate, with functional support from the Central Services Directorate in the form of communications and computer services, and research support from the Atmospheric Research Directorate. In turn, the subactivity also furnishes information to related subactivities within the AES and provides elements of infrastructure support to their operations.

Because of the country's large size and relatively small population, Canada's weather service is based on a "single service" concept, by contrast with the duplicated weather services provided by some countries (e.g. separately for military and civilian needs, and for aviation and non-aviation).

In support of the direct provision of weather services and of other subactivities of the AES, data collection and dissemination systems must be maintained, linked by a multi-facetted communications network and supported by a centralized analytic and forecasting capability. This infrastructure accounts for about 76 per cent of the gross expenditures of the Weather Services subactivity and about 55 per cent of those for the AES as a whole.

The Weather Services subactivity thus depends upon the continuous collection of surface and upper air weather observations made available in real time for weather analysis, forecasting and advisory purposes. The data are collected through 355 surface stations, including lighthouses and buoys, as well as 33 upper air stations, 12 radar sites, 6 satellite readout stations, and 400 voluntary ships.

For national and international dissemination, this information feeds into a communications system which includes national teletype, paper facsimile and photo facsimile networks. The large-scale computer complex at the Canadian Meteorological Centre in Montreal is also, by virtue of its remote entry and access capabilities, a major element of this communications system, but its main function is the use of mathematical models of atmospheric conditions to generate forecasts of meteorological conditions on a large scale for periods of up to five days from the basic observations.

Direct service to the various clientele begins in the nine weather forecast centres across Canada, where professional meteorologists use the computerized general forecasts, as well as the original observations and supplementary information, to prepare appropriate warnings, detailed forecasts and other bulletins for distribution in their respective geographic areas. Fifty-nine smaller weather offices, located mostly at airports and staffed by meteorological technicians, provide a variety of augmented client services not readily available from the nine forecast offices.

During the past decade, the program's budget has been constant in real dollar terms along with a significant decrease in PYs, but the services provided have been extended and improved through productivity enhancements.

The approximate division of resources among the various subactivities of the Weather Services subactivity is shown in the following table, prepared for 1984-85:

EXPENDITURES
$000s

	PY	Salary	O&M	Capital G&C	Total
Public Weather Services	441	16,480	1,539	42	18,061
Marine Weather Services	9	323	84	-	407
Aviation Weather Services	124	4,721	255	-	4,976
Economic Weather Services	39	1,511	141	-	1,652
Canadian Forces Wx Services	105	4,763	2,636	-	7,399
Data	541	20,072	16,853	5,753	42,678
Wx Service Support System	613	24,861	27,909	8,358	61,129
TOTAL	1,872	72,731	49,417	14,153	136,302

The above figures for Aviation Weather Services and the Canadian Forces Weather Service (12,375.K in all) are net of approximately $14,684K in cost recoveries.

BENEFICIARIES

The Weather Services program serves a number of distinct clientele as follows:

- Canadians in general through basic public weather forecasting, information and services, and through the provision of weather warnings and emergency services;
- the marine transportation and aviation industries, as well as the operation of the Canadian Forces Weather System. These services are covered to a major extent by cost-recovery agreements;

- various weather-sensitive economic sectors such as agriculture, forestry, commercial fishing, tourism, and offshore resource development, with very large economic payoffs;
- meteorological services are also provided to other subactivities within the Atmospheric Environment Service activity, e.g., Climate Services.

Through internal or contracted R&D, instrumentation and equipment developments have been "spun off" to the private sector which has exploited them on both the domestic and international markets. This applies to the Atmospheric Environment Service generally and thus, in addition to such equipment as surface automatic weather stations and weather satellite readout and analysis instruments, also includes items like sun photometers, ozone measurement equipment, and sideways-looking airborne radar. There is also substantive private sector involvement in mainstream weather service activities, e.g. in the area of collecting weather observations, and in communications.

OBSERVATIONS

The Weather Services subactivity has a strong basic justification, stemming from such considerations as: the right of the public to warnings of severe weather; aviation safety; marine safety; national defence and sovereignty; obligations under reciprocal exchange arrangements with the World Meteorological Organization.

From the technological standpoint, there appear to be no obvious deficiencies in the service; management is its own severest critic in this regard. In respect of the density of observation stations, for instance, it is pointed out that Canada stands relatively low in international rankings. On account of geographical considerations, such comparisons may not be wholly valid; in any case, several large gaps in the observation network exist. Nevertheless, AES management emphasizes that superior technology and operational efficiencies deliver an end product of world calibre.

As noted previously, the Weather Services' budget has stayed constant in real terms for almost a decade. During this period of time, service requests are said to have doubled, ten more airports are being served, the number of marine areas served has increased due to the establishment of the 200-mile limit, and the quality of forecasts has improved through the installation of the CRAY computer set-up and the forecast modelling capability which supports it.

But management asserts that the scope for internal economies is now fully exploited under present technology, and that further productivity gains depend upon additional investment in modernizing equipment. Hence the pros and cons of the draft AES long term plan for weather services productivity (presently "on hold" for the duration of the Task Force on Program Review) have to be central to any discussion of the future direction of the Weather Services subactivity.

The plan is argued in terms of the need to improve the quality and accessibility of established civil and military weather services, and to meet new and expanded requirements for weather services, including extensions to public and economic sectors now only partially served. In particular, it is argued that there need to be:

- an improved data acquisition system that is current in automation technology, and less demanding of human participation. Space-based systems should be used as sources of data for the oceans, the Arctic and the upper atmosphere;
- more emphasis on regionalization (i.e. decentralization) and augmentation of short-range (mesoscale) weather warnings where human input is most effective, with centralization (and increased automation) of medium and long-range forecast production; and
- automation and streamlining of general and specialized weather information dissemination, with possible cost-recovery for the provision of specialized services.

It is estimated that the implementation of these proposals would increase AES capital requirements over the next decade, with much of this being "up front" in the form of hi-tech automated equipment from Canadian manufacturers. PY requirements would be higher at first, due to parallel running, but would eventually settle down at lower than present levels.

What really has to be debated in regard to this plan is not so much its technical details as the implications for the range and quality of service levels. AES is currently addressing the question of what the basic level of weather services, to be underwritten from public funds, should be. As this thinking develops, it will provide the rationale for priority determinations within the "core", or basic, services, and will also help resolve the question of what services should be cost-recovered. Finally, there will be the question of the nature and extent of the role to be played by the private sector in AES's plans for extending and improving the quality of weather services.

The general public appears to be satisfied with the adequacy of services provided by the subactivity, but reacts forcefully to perceived reductions in service when office closures or reductions of hours are proposed; plans to close two weather offices were recently reversed due to public pressure.

As regards potentially more critical clientele, senior officials of departments to which the Atmospheric Environment Service provides meteorological services on the basis of Memoranda of Understanding - in particular, the Canadian Air Transport Administration of Transport Canada and the Department of National Defence - indicated that they too are generally well satisfied with the existing arrangements which, it should be noted, involve the reciprocal exchange of basic services as well as the provision by AES of special services on a cost-recovery basis. At working levels within the various arrangements, however, the situation is not always so idyllic. For instance, the increasing tendency of the Flight Service Stations of CATA to provide aviation weather information services to pilots is apparently interpreted by AES as an intrusion upon its proper preserve. A joint AES-CATA team is understood to be currently reviewing the situation with a view to developing a plan to serve aviation requirements in the most cost-effective manner.

On the question of private sector involvement, the stated position of Environment Canada is to "encourage the growth and diversification of the Canadian private sector by such means as contracting out, technology transfers, joint ventures and privatization, and by not undertaking those activities which the Canadian private sector can or could be encouraged to do". In regards to technology transfer, there is ample evidence that the policy is flourishing.

The latter portion of the preceding statement, i.e. "..... by not undertaking these activities which the Canadian private sector can or could be encouraged to do", presumably means that AES is willing to leave to the initiative of the private sector activities which go beyond the provision of general, "public good", services, e.g., unique services for particular users or enhanced or augmented versions of the basic public service. The earlier part of the statement appears to say that, even within the area of service which AES considers to be its direct responsibility, it is willing to involve the private sector through the kinds of arrangement mentioned.

Private sector opportunities ought particularly to be expected in the area of weather services beyond what could reasonably be considered as the core responsibility of AES. A crisper definition of where the dividing line lies between what basic services AES should provide as a public good, what services should be cost-recovered, and what services should be left to the private sector, and a somewhat firmer resolution on the part of AES not to cross it, would perhaps provide an atmosphere more conducive to the growth of Canadian private sector capability.

Yet even in spite of uncertainty as to where exactly the threshold of opportunity for the private sector begins, there is undoubtedly a market for the private sale of meteorological services, as evidenced by the success stories - noted, for example, in the Dowdeswell report of 1983 - of U.S. companies operating in Canada. Is this a situation in which the U.S. private meteorological industry, with its larger domestic market and its overheads therefore already covered, is in fact, "dumping" meteorological services in Canada, and thus inhibiting the development of a viable Canadian industry?

ASSESSMENT

The central issue addressed in this assessment lies not with technical matters, but rather with the underlying premises of the weather services sub-activity, as the preceding observations will have indicated. These latter suggest the strong desirability of clearly defining - and making publicly known - the level of core services which the Weather Services sub-activity is prepared to provide as a public good to all Canadians. Beyond this point lies a variety of special or enhanced services which the public at large should not be expected to subsidize.

The sub-activity has a continuing obligation to consider not only how these special and supplementary services can best be provided - whether, for instance, through cost-recovery or being left to the private sector - but also how those basic services making up the "core" program are to be provided. In this connection, it should not be taken for granted that the weather services sub-activity need do all the work in those areas regarded as its primary responsibility.

The sub-activity is, for instance, understood to be addressing very seriously the problem of marketing its outputs more effectively and with a keener eye upon revenue generation. It may therefore be possible within this process to identify new approaches to, or extended opportunities for, private sector involvement.

As regards services other than core, it should virtually be an underlying principle that these always be provided by the private sector, with AES itself offering them only as a last resort on a cost-recoverable basis.

In respect of both kinds of potential private sector applications - core services, and those going beyond core - the "rules of the game" need to be such that the Canadian private sector meteorological capability can compete against its U.S. counterparts with respect to the servicing of Canadian clients on an equitable basis.

The AES long term plan, referred to earlier as being temporarily in limbo, should remain so until there is a much clearer resolution of the logically prior issues referred to elsewhere in this assessment. When this has been achieved, it should then be possible to take a more realistic view of what needs to be done to maintain, or even enhance, to the extent agreed upon as desirable, the range and quality of Canadian meteorological services.

In the context of this assessment, it can be noted that a recent "Rayner review" of meteorological services in the U.K. focused upon issues virtually identical to those considered here, namely, the determination of appropriate service levels for different clientele, and principles to determine who should pay for what. There did not appear, however, to be any strong emphasis upon a greater role for private sector meteorological capability. Indeed, the

British meteorological office, a Crown agency, is directed to actively compete against the private sector.

One avenue of inquiry originally considered promising by the U.K. review was the question of person year utilization in field operations, where major savings were thought possible. Closer inquiry, however, confirmed what is a well-established principle in Canada, namely that, to deploy a given service-type position 24 hours per day, on a year-round basis, inescapably requires almost six person years.

CLIMATE SERVICES AND RESEARCH

Environment Canada

OBJECTIVE

To provide climate data and information services, as well as climate forecasts, in an integrated program that fosters understanding of the effects on climate of increasing atmospheric pollutants such as carbon dioxide, as well as an understanding of the social and economic consequences of such effects and those of climate hazards and variations, and that provides information for planning and decision-making required to support Canadian socio-economic activities in which climate is a factor.

AUTHORITY

The Government Organization Act of 1979 assigns to the Minister of the Environment explicit responsibility for meteorology, and also directs that the Minister shall "initiate, recommend and undertake programs and co-ordinate programs of the Government of Canada that are designed...to provide to Canadians environmental information in the public interest".

Responsibilities also derive from commitments to cooperative international programs.

DESCRIPTION

Climate Services and Research constitutes a subactivity within the program-activity structure of the Atmospheric Environmental Service of Environment Canada, currently accounting for approximately 7 per cent of the Service's gross expenditures. The principal organizational component of the subactivity is the Canadian Climate Centre (CCC), located in Downsview, Ontario. The Centre receives functional support from the Field Services Directorate, mainly in connection with the provision of climatic data to regional users. The Centre is also supported by the Central Services Directorate in Downsview which provides computer services in connection with the archiving and retrieval of climatic data.

Climate is a long term atmospheric condition compared to weather which is the state of the atmosphere at any given time. Centering mainly around the incidence and impact of solar radiation, wind movement and precipitation, it identifies what is typical or unusual for a place and season. It is thus a basic constraint or determinant of most economic and social activities, such as agriculture (growing degree days, frost dates), forestry (susceptibility to outbreaks of fire), energy utilization (heating degree days), construction (building codes), recreation and tourism (sunshine and snowfall indexes), etc.

Consequently, the principal function of the subactivity is the provision of climate information to a broad spectrum of users - the general public, private industry, provincial agencies, and other federal departments. Most enquiries are received and processed at local weather offices and regional offices across Canada. The Canadian Climate Centre processes enquiries which cannot be handled regionally, and also assists the regions as required. The Research Program of the subactivity is also an important client for climate information.

The ability to provide climate information to users rests in the first instance on the massive data base of national, historical and statistical climate data contained in the National Climate Archive of the Canadian Climate Centre. The Archive services requests directly and also assists the regions in maintaining short-term archives to meet local needs. In addition, it provides a data base for research and applications programs in both the government and the private sector.

Data flow into the Archive continuously from the real time meteorological network, and from an extensive network of climatological stations. Some data from private collection networks are also picked up by the Archive. The Centre does not itself operate collection networks. It does, however, perform a quality control function relative to data coming into the Archive.

A major development in the history of this area of work was the approval by Cabinet in 1984 of a Canadian Climate Program. This was essentially Canada's national response to the World Climate Program, originating with the World Meteorological Organization in Geneva. It provides for an integration of climate-related activities in other federal departments, the provinces and Canadian universities, and will make available monthly and seasonal predictions of temperature and precipitation by 1985 and year-ahead predictions of these variables by 1995, as well as preliminary predictions of the effect of increasing atmospheric $CO2$ on Canada's climate by 1985 and definitive predictions by 1995. The program is managed by a hierarchical structure comprising a Climate Planning Board, a Climate Advisory Committee and Regional Climate Advisory Committees. Federal and provincial agencies, the university community and the private sector are all represented within this structure. This new responsibility is being accommodated with a relatively modest increase in program resources.

Research is undertaken: to understand the effects of cumulative atmospheric pollution, as for example, by carbon dioxide on future climate; to advance understanding of the effects of man on climate and the impact of climate on human activities, the economy and the environment; to develop the capability to predict climate on a monthly, seasonal and annual basis; and to provide a prediction service to satisfy the socio-economic and planning needs of Canadians. The research budget is presently about 5 per cent of that of the program as a whole.

The program is funded through the budget of Environment Canada, with nominal cost recovery (approximately $50K per year) from the sale of publications and from consultations.

The approximate division of resources among the various activities of the program is shown in the following table prepared for 1984-85:

			$000s			
	PY	**Salary**	**O&M**	**Capital**	**G&C**	**Total**
Climate Services	144	4,989	2,874	399	-	8,262
Climate Research	14	678	52	24	-	754
Climate Services Support Systems	68	2,637	2,164	219	137	5,157
TOTAL	226	8,304	5,090	642	137	14,173

The person years contributed by the various organizational units involved in the work of the Climate Services and Research Subactivity during 1984-85 were as follows:

	Finance & Admin. Branch	Canadian Climate Centre	Central Services Directorate	Field Services Directorate	Total
Climate Services	--	95	1	48	144
Climate Research	--	14	--	--	14
Climate Services Support System	1	8	46	13	68
Total for Subactivity	1	117	47	61	226

The overall dollar budget for the subactivity has been relatively stable during the past few years at about $15 million. A projected increase of approximately one million dollars for 1985-86 and beyond is attributable to the Canadian Climate Program.

BENEFICIARIES

The program makes its impact across a diffuse area of potential applications as follows:

Agriculture	The Canadian Wheat Board uses the data for long term forecasts and marketing strategies.
Construction	National Research Council includes data as supplement to National Building Code.
Water Resources	Consultants, municipalities and provinces use the data for planning and design purposes.
Climate Consultants	Private consultants provide interpretation and analyses of the data for specific applications determined by clients.
Offshore Resources Development	More effective use of drilling rigs through less downtime by having better data on climate-induced waves, surges, currents and ice.
Oceanography	Better understanding of the role of heat and CO_2 in oceans will lead to improved capability to forecast long and short term climate.

Environmental Quality	Data used in preparation of environmental impact statements.

Program outputs are delivered in an essentially reactive way, by response to inquiries which have been growing by about 5 per cent per year, and presently run at about 250,000 per year. As noted earlier, most of these inquiries are handled in the regions.

OBSERVATIONS

Subactivity management notes that a considerable quantity of climatic data is collected outside the scope of the service, e.g. in the network of precipitation stations operated by the Canadian Wheat Board, but that it cannot be used by the program because it is "non-standard".

Some aspects of coordination with the operations of other programs appear less than ideal. Additional observation stations are needed in the North but, due to the inability of AES to allocate adequate funding, it was unable to take advantage of opportunities to share observation facilities with the Inland Waters Directorate.

The level of research activity in the subactivity falls short of the indicated needs, for example, in the area of climatic change.

The plans for the Canadian Climate Program are said to have included an Oceans component, for which Fisheries and Oceans would be responsible, but this appears not to have been approved.

ASSESSMENT

The quality of potentially valuable data available to the Climate Archive, but not apparently made use of because of its nonstandard nature is a matter of some concern, implying as it does unexploited possibilities for reducing duplication of effort. The Atmospheric Environment Service is currently working on the establishment of a system which should permit more extensive usage of nonstandard data.

The loss of the potential for significant amounts of climatic data that could have been obtained through the sharing of observation facilities with Inland Waters Directorate in the North appears regrettable. The ability to draw up further agreements would appear to be constrained by available funding in the subactivity.

In the same way, it appears that the Canadian Climate Centre will be hampered in realizing its full potential, as long as the originally planned Oceans component is not operative.

Traditionally, the subactivity's dissemination operations have, in large measure, been reactive although it is understood that a more proactive marketing approach is now being taken, with greater emphasis on revenue generation and the reduction of costs through possible devolution of certain functions to the private sector.

The commitment of the sub-activity to research appears to be less than fully effective in the light of the relatively small commitment of resources to the important agenda of research topics frequently cited by the subactivity.

AIR QUALITY SERVICES AND ATMOSPHERIC RESEARCH

Environment Canada

OBJECTIVE

To develop, operate and maintain systems for acquiring data on the quality of the atmospheric environment and on the deposition from the air of contaminants in Canada and in adjacent waters; to provide information on and predictions of air quality conditions for areas of Canada and adjacent waters; and to advance knowledge and understanding of the nature and behaviour of the atmosphere and its constituents, and their interactions with man, his activities, and other components of the natural environment.

AUTHORITY

The Government Organization Act of 1979 directs the Minister of the Environment to "initiate, recommend and undertake programs and coordinate programs of the Government of Canada that are designed...to provide to Canadians environmental information in the public interest".

Responsibilities also derive from the Weather Modification Information Act of 1971.

DESCRIPTION

The Air Quality Services and Atmospheric Research subactivity is the smallest in dollar expenditures of the principal subactivities which make up the Atmospheric Environment Service activity, accounting for about 6 per cent of the latter's current budget. Organizationally, it forms part of the Atmospheric Research Directorate which additionally carries out, through the Meteorological Services Research Branch, research and development in support of the prediction services of the AES.

The subactivity provides air quality services which include: air quality monitoring (other than LRTAP mentioned below); the provision of environmental impact assessments; and environmental emergency support, advice and consultations. Research is also carried out on the atmospheric transport, transformation and deposition of air pollutants and toxic chemicals (generally referred to as the LRTAP program - Long Range Transportation of Air

Pollutants). This work is carried out in close collaboration with the provinces and international bodies.

Other important research work conducted by the subactivity is designed to help better understand atmospheric processes in the troposphere and the stratosphere. This covers various aspects of cloud and precipitation physics, weather radar and weather modification, as well as the gathering and interpretation of the stratosphere (especially the effects of ozone). An ozone monitoring network of 5 stations (Toronto, Edmonton, Resolute Bay, Goose Bay and Churchill) is maintained, as well as the 22 stations of the Canadian Air and Precipitation Monitoring Network (CAPMON) and the 18 stations of the Canadian Network for Sampling Precipitation (CANSAP).

The approximate division of resources among the various elements of the Air Quality Services and Atmospheric Research Subactivity is shown by the following approximate figures for 1984-85 (later adjusted upwards):

($000s)

	PY	**Salary**	**O&M**	**Capital**	**G&C**	**TOTAL**
Air Quality Service	12	476.0	114.4	53.5	---	643.9
Air Quality Res.	51.9	2,426.0	521.2	721.9	---	3,669.1
Research-Atmospheric Processes	28.1	1,234.5	1,542.0	1,440.0	---	4,216.5
Support Systems	14	985.4	771.7	133.2	141.6	2,031.9
TOTAL	106	5,121.9	2,949.3	2,348.6	141.6	10,561.4

The overall budget for the program during 1985-86 is set at 15,103 ($000s) and 122 person years. Funding for the program, which largely operates out of Downsview, Ontario, headquarters, is almost wholly provided by Environment Canada, with marginal recoveries from sources such as the energy and space programs.

BENEFICIARIES

Information provided by this program is used by policymakers in federal scientific and regulatory departments, and provincial agencies, as well as by international bodies including the International Joint Commission, the World Meteorological Organization, and the U.N. Environmental Program. The program provides direct support to the Federal-Provincial Committee on Air Quality and the meteorological science community. It also provides the scientific information needed in other parts of the Department of the Environment - for example, to support the federal position in negotiations with the provinces, the United States and other countries on air quality standards and measures to control pollution such as acid rain.

Information generated through the research and development work of the sub-activity is made publicly available through scientific papers and reports, conferences and workshops, and through departmental publications.

Approximately 50 per cent of the program's O&M budget (which is currently some $5 millions per annum) is contracted out. Some of this goes to support university research in areas of priority to AES, but the majority is spent with hi-tech firms in projects like ozone measurement.

OBSERVATIONS

The issues addressed by the Air Quality Services and Atmospheric Research sub-activity have an obvious potential for serious prejudice to the quality of life of Canadians. The federal government must be seen as taking the lead in addressing them on a national basis, and also, because of their global character, Canada, as a responsible member of the world community, must participate in international efforts to resolve them on a scale in keeping with its known resources and scientific capability. The necessity for a program of this kind thus seems self-evident.

The quality and relevance of the sub-activity's research meets with peer approval as evidenced by a recent review carried out by the Royal Society of Canada. The program's research in the areas of acid rain and the long range transport of air pollutants were particularly singled out as noteworthy.

There exists prima facie evidence of the desirability of further extending the research capability embodied in this sub-activity. This ranges all the way from popular assertions that "we are not doing enough" to more concrete illustrations of significant payoffs that could result from marginal extensions to work already ongoing.

As examples of the latter, management cites the usefulness of more experiments conducted from manned space flights. The need is argued for more modelling work from the present data base, e.g. in the area of acid deposition. This in turn would necessitate an increase in computer power.

ASSESSMENT

In its technical and scientific dimensions, the work of the sub-activity appears to be of high calibre and appropriately oriented from a priorities standpoint.

There are, however, grounds for concern in two areas. First, although the sub-activity is providing a strong leadership role in Acid Rain, it is not clear that the sub-activity is playing a sufficiently explicit and aggressive role in coordinating, integrating and furnishing professional leadership with respect to the whole body of ongoing work in Canada in the area of atmospheric pollution.

Secondly, the work of the sub-activity would obviously benefit from more public understanding and support, but there do not appear to be enough ongoing activities to this end.

ICE SERVICES

Environment Canada

OBJECTIVE

To provide ice data and advice for the safety of Canadians, the security of their property, the support of economic activities and the protection of environmental quality in Canada.

AUTHORITY

The Government Organization Act of 1979 directs that the Minister of the Environment shall "initiate, recommend and undertake programs and coordinate programs of the Government of Canada that are designed ... to provide to Canadians environmental information in the public interest".

Responsibilities also derive from commitments to cooperative international programs, notably the World Meteorological Organization, the Intergovernmental Maritime Organization, and various bilateral agreements.

DESCRIPTION

The Ice Services subactivity forms part of the overall Atmospheric Environment Service activity of Environment Canada. The subactivity is closely linked to, and benefits from, the infrastructure for the Weather Services subactivity. A large portion of its expenditures is cost-recovered from clients, and its net costs, in person-years and dollars, are in consequence the smallest of any subactivity within AES. Organizationally, it forms part of the Central Services Directorate of AES.

In summary, the subactivity covers: The development and maintenance of acquisition systems for ice data; the provision of forecasts of ice formation, growth and movement in Canada's major rivers and lakes, and adjacent waters, for the protection of the environment and in support of marine economic and public interests generally over the 200-mile zone; the maintenance of an ice climatological archive for use in the design and planning of ice-sensitive activities in Arctic and offshore development; and the conduct of research to develop techniques for the improved remote sensing of ice and for improved ice forecasting methods.

Ice observations are conducted from aircraft, ships, and shore stations; these are also supplemented by satellite observations. From the AES Ice Centre in Ottawa, regular short-range tactical forecasts of the extent and characteristics of ice are provided as well as less frequent longer-range strategic forecasts, covering the Lower St. Lawrence River, the Gulf of St. Lawrence, the coastal waters of Newfoundland and Labrador, Hudson's Bay and its approaches, and the waters of the Canadian Arctic, including the Beaufort Sea. The work of the subactivity is coordinated with that of their U.S. counterparts who exercise surveillance over sea lanes on the East Coast south of the 46th parallel. In addition, ice climatological services are provided in support of winter-time Arctic development and industrial development along Canada's East Coast.

The sub-activity is being expanded to provide, by 1987-88, detailed iceberg surveillance and expanded Arctic services in support of the East Coast and Arctic offshore oil and gas developments. This is reflected in operating costs which are currently some 50 per cent higher than three or four years ago. Provision has been made for, inter alia, the operation of an extended range DASH-7R aircraft (owned by MOT) and new equipment for improved surveillance and communications.

The approximate division of resources among the various functions of the Ice Services subactivity is shown in the following table prepared for 1984-85:

$000s	**PY**	**Salary**	**O&M**	**Capital**	**Total**
Ice Reconnaissance	30	1,512.7	14,581.8	1,281.5	17,376.0
Ice Forecasting	18	741.9	492.7	117.0	1,351.6
Ice Climate Services	4	177.1	113.0	-	290.1
Ice Services Support Systems	10.7	580.4	2,902.9	859.0	4,560.5
TOTAL	62.7	3,012.1	18,090.4	2,257.5	23,578.2

The figure of ($000) 14,581.8 shown for O&M under Ice Reconnaissance is the largest single expense for the subactivity and is in fact mainly incurred for aircraft surveillance. Most of the expenditures of the Ice

Reconnaissance Service are recoverable, e.g. some ($000) 14,293 were recovered in 1984-85.

BENEFICIARIES

Principal governmental beneficiaries of the Ice Services Program include the Canadian Coast Guard (safer operation of marine transport), the Canada Oil and Gas Lands Administration (control of offshore resource development), and the St. Lawrence Seaway Authority (longer shipping season).

Economic beneficiaries include the offshore resource industry (efficiency in operation of drilling rigs), fishing industry (better managed operations) and the marine industry generally (less damage to ships and more intensive usage). Economic benefits are difficult to quantify, but the program has, for example, made it possible to use otherwise idle ships during winter and thus greatly increase the volume of exports from Canadian waters.

Other private sector beneficiaries include the aircraft leasing industry (ice surveillance) and consultants who use ice data to provide specialized services to clients.

Aerial ice surveillance flights also support Canadian sovereignty on the East Coast and in the Arctic.

OBSERVATIONS

The Ice Services subactivity has a strong prima facie justification, due to self-evident considerations of environmental protection and public safety, as well as the economic benefits stemming from reduced ice hazards.

The needs for Ice Services are in a constant state of evolution. Whereas a few years ago there appeared to be a major likelihood of the Northwest Passage being used for the shipment of Arctic oil, and therefore a need to step up Ice Service activities in the North, priorities have now noticeably shifted to the East Coast, under the stimulus of expanding exploration activities and the shock of the Ocean Ranger disaster.

ASSESSMENT

Notwithstanding beneficiary support for the mandate of the subactivity as a whole, perceptions of where its "public good" dimension ends are far from clear. The Department of the Environment has asserted from time to time that its mandate is to provide regional ice reconnaissance and forecasting services (i.e. those of a general-purpose, or broad-brush, character) and that the provision of site-specific services in real time was to be left to the private sector., It appears, however, that RADARSAT has a capability for site-specific work and, if this is to be actively pursued when RADARSAT becomes operative, it might provide cause for friction with the private sector, even though it would not be a "real time" service. Again, in the context of a recent announcement that there would be, in 1986-87, charges to the public in the order of $1 million, one private sector operator has complained that this is an invasion of the private sector's market. Whether this assertion is correct or not, it suggests a need for a clarification of what constitutes core, or "public good", services in the operation of the subactivity as opposed to the kind of services for which it will make a charge, and further, to reaffirm what are the kinds of services for which the subactivity does not consider itself responsible - with or without payment.

The Ice Services subactivity appears to be well abreast of relevant technology for meeting its present and emerging commitments for ice surveillance in the Arctic and off the East Coast. The delivery vehicles for the actual surveillance instrumentation (such as Sideways Looking Airborne Radar, or SLAR) are presently two aged Electras, contracted from Nordair until March 31, 1987. The territory covered is a very large one and the equipment is hard-pressed to provide the necessary frequency of surveillance, but this situation will be alleviated when the new DASH-7R, the operation of which is to be put out to tender, comes on stream. Program management notes that RADARSAT will obviate the need for one of these aircraft by the 1990s. It is not clear at the present time whether the subactivity will be charged for RADARSAT services.

As noted above, a major proportion of the program's budget is allocated to contracted O&M services, with much of this going to aircraft operation. The way in which these services are contracted for is thus a sensitive issue, but it is not clear whether there has in the past been complete consistency with respect to the equity of policy and practice in this area.

In general, however, there seems to be a healthy orientation towards private sector participation in the various areas of the subactivity's responsibilities, and an Association of Ice Consultants of Canada has been formed. The very existence of the Ice Services subactivity has given rise to independent, but parallel, opportunities for work outside the subactivity's mandate, but there will no doubt be continuing and increasing pressures for "part of the action" with respect to the subactivity's core responsibilities. In this connection, the subactivity's managers and the representatives of the Association of Ice Consultants of Canada are understood to be working on the definition of ice reconnaissance standards. When available, these will permit sound contractual relationships and contribute to high standards of ice information.

WATER MANAGEMENT DATA

Environment Canada

OBJECTIVE

To promote the sound management and development of the water as a natural resource.

AUTHORITY

- Canada Water Act
- Government Organization Act (1979)
- The Department of the Environment Act
- International River Improvements Act

DESCRIPTION

The Inland Waters Conservation Program is broken down into the following activities in decreasing order of the allocated resources consumed: Water Data, Water Research, International and Interjurisdictional Waters, and finally, Flood Damage Reduction.

Under the Canada Water Act, a public "Inquiry on Federal Water Policy" is currently under way and will report in August 1985. This may well lead to the development of a freshwater strategy to guide federal efforts in water management for the next decade.

Water Management Data

Under cost-shared agreements with all the provinces, Environment Canada collects, processes and disseminates data on water levels, river discharge, snow surveys, sediment and water quality. Inland Waters Directorate (IWD) uses 570 person years and $38 million to do this. Water quantity data is collected at nearly 3,500 locations across Canada, of which the provinces contribute roughly $4.5 million to the operating costs towards 1,700 of these stations, under federal-provincial agreements. The hydrometric survey has already in place 120 automated data collection platforms (DCP) out of 350 systems to be installed by 1988. These DCPs are devices to collect and transmit water data from remote sites via satellite communications. Sediment data are collected at over 130 sites. Snow survey data are collected at about 20 locations, down from 430 stations ten years ago.

A cooperative arrangement exists between Inland Waters Directorate and Canadian Hydrographic Service (CHS), through a Memorandum of Understanding, concerning water level measurements. The MOU establishes each party's responsibility associated with the physical data collection, the processing of the data, its review and publication. Over the Great Lakes and the St. Lawrence, IWD does the physical collection from the basic network, whereas CHS does the processing and review of the data. IWD then publishes the data. Beyond this basic (non real-time) network, used by IWD for water management purposes, there is a real-time network under the total responsibility of the CHS, the purpose of which is to collect data for marine transportation.

To monitor water quality, Environment Canada collects, processes and disseminates data from 50,000 samples taken at 645 locations across Canada; to do so requires roughly ten tests per sample annually. A cost-shared water quality monitoring agreement has just been signed with Ouebec. Similar agreements with four more provinces are expected during 1985-86. Once all new cost-sharing agreements are in place, the sampling network will involve about 1800 sites.

Water Research

Approximately 379 person years and $38 million are allocated in 1985-86 to provide the scientific basis for appropriate water resource management decisions. The areas investigated relate to quantity and quality of water, and short and long-term water problems and opportunities. This research is carried out at two Institutes: The National Water Research Institute, at Burlington, Ontario, and the National Hydrology Research Institute, now in Ottawa, but to be transferred to Saskatoon in 1986. Not all of the activities at Burlington Institute are of a research nature: about 10 per cent relate directly to water management data. The activities of the Hydrology Institute, on the other hand, are all related to research. High visibility programs of Environment Canada (Toxics and LRTAP) will use up 164 person years and $10 million in 1985-86, for all of IWD.

Research work is carried out on the measurement, dynamics, forecasting and modelling of surface waters, hydraulics, groundwaters, river ice and aquatic ecosystems.

International and Interjurisdictional Waters

One hundred and fifty-nine person years and $17 million are required to provide staff and technical support for more than 30 Control Boards and Committees under the International Joint Commission, and 19 under federal-provincial agreements, to address pertinent water issues and supervise the management of transboundary waters. Negotiating water quality objectives (at least one per annum) for transboundary waters is a major objective.

Flood Damage Reduction

Forty person years and $9 million are allocated in 1985-86 towards flood control projects and to continue nonstructural methods of reducing flood damages and subsequent payments. To minimize these payments, flood damage reduction agreements are negotiated with the provinces and territories, under which communities are mapped to identify flood risk areas, so as to relieve the federal government of any additional liability for these areas in the future. To date, some 41 designations of flood plan areas, covering about 300 municipalities and seven million people, have been made. This will be further increased during this fiscal year under eight major flood damage reduction agreements.

EXPENDITURES ($000s)

Inland Waters Directorate

	Estimates 1985-86	
	$	**PYs**
Person Years		1,094
Salaries & Wages	46,674	
Other O&M	25,473	
Capital	16,817	
Grants & Contributions	11,864	
TOTAL	100,828	1,094
Less: Revenue Credited to Vote	- 5,223	
NET TOTAL	95,605	1,094

Water Management Data (of Inland Waters Conservation Directorate).

	82-83	**83-84**	**84-85**	**85-86**
Sal.& Wages	16,175	15,742	17,697	20,449
Other O&M.	10,390	11,835	11,264	11,843
Capital	2,982	4,885	4,717	4,978
Grants & Cont.	700	754	999	990
TOTAL	30,247	33,216	34,677	38,260
Less: Revenue Credited to Vote	5,162	3,959	4,140	5,610
NET TOTAL	25,085	29,257	30,537	32,650
Person Years	501	515	497	525

BENEFICIARIES

Provinces, territories and municipalities for drinking water supplies, infrastructure design and flood forecasting; the agriculture sector for irrigation; industry for water supplies, infrastructure design, power production, navigation; all agencies involved in the recreational industry.

Data handbooks, along with about 40 analysis reports, are distributed to 1,000 client agencies and managers. In addition, about 6,000 requests for current data and/or analyses of historical data are received and actioned annually. Forty years of water quality data, containing the results from 4.5 million tests, are directly accessible on national computer data banks (NAQUADAT), while over 80 years of water quantity data, comprising 68,000 station-years of discharges, 19,000 station-years of water levels and 12,000 station-years of sediment information, are indirectly accessible from the national hydrometric data bank (HYDAT).

OBSERVATIONS

A departmental program evaluation carried out in 1979-80 reported the Water Management Data Program to be economic, efficient and effective. A comprehensive audit undertaken by the Auditor General's office in 1984 found that the system was functioning satisfactorily and that it was well managed. A study by Acres, in 1977, showed that the potential benefit/cost ratio of water quantity management data was greater than eight.

The importance of water to Canada, in the quantity and quality required, is self-evident and hardly needs to be demonstrated. Like all resources, it needs proper management, and to do so, data on water quantity and quality are essential. The Water Resources Branch of IWD, which carries out the water quantity surveys, has acquired over many years, and maintains, a sound reputation in its total output.

The various existing survey networks appear to be about the optimum density as far as number and representativeness of stations are concerned except for the water quality network which is still in the growing stage.

The agreements with the provinces on water quantity hydrometric networks have been in existence since 1975. Except for the Province of Quebec, the federal government operates the networks in the various provinces on a cost-sharing basis. The prime need for any station determines who pays for what, between the two partners in each province. In Quebec, it is the province which operates most of the hydrometric network, but the cost-sharing arrangement is the same as elsewhere, except that the federal government reimburses its share to the province, as opposed to the situation in the other provinces where it is they who reimburse the federal government for their share. A similar agreement in water quantity exists with INAC for the Yukon and Northwest Territories.

Only one federal-provincial agreement exists at the present time with respect to the co-operative water quality network. This is with the Province of Quebec.

The two main networks of water quantity, on the one hand, and of water quality on the other, are operated independently, by and large. Only in a few cases are the two operations performed by the same staff, or in the same location. There are two distinct career paths for the technicians of the Water Resources and Water Quality Branches.

Cooperation of IWD with AES to integrate meteorological data gathering with the water quantity stations is proceeding slowly at the national headquarters of both Services and also apparently in the Western and Northern Region.

Both IWD and AES are also involved in effecting snow depth surveys, IWD having 99 such snow courses in 1982-83, while AES had 130 in the same year. The IWD is in the process of drastically reducing its network and now only operates 20 stations to support a federal-provincial flow forecasting agreement.

At a very few Water Survey of Canada sub-offices there are native technician full-time employees.

Over 10 per cent of the Canadian population rely on groundwater for drinking purposes. There is also some limited use of groundwater by industry and agriculture. Groundwater, generally being very localized, is a provincial resource, and the federal role in such a resource is not clear. Groundwater will have to be considered in any comprehensive water management strategy.

The Inland Waters Directorate has a very substantial allocation of person year resources in the Water Planning and Management Branch, at headquarters (60 person years). Slightly over two thirds of these, along with another 100 person years from other IWD Branches, are entirely dedicated to look after the International and Interjurisdictional Water Management Program.

The allocation of person year resources amongst the five Regions, appears at first glance, to be anomalous in the extreme (from 28.5 person years in the Quebec Region, all the way to 223.3 person years in the Western and Northern Region). However, it is recognized that there are very good explanations for some of the differences: e.g. the Province of Quebec does most of the data gathering with its own staff, while the Western and Northern Region has almost half of the entire 3,500-station hydrometric network.

A recent survey has revealed that there are about 600-700 users of the annual water quantity data (40 per cent from governments; 60 per cent from the private sector). There is currently no cost-recovery for the information provided.

The Auditor General's report of 1984,noted that the Water Resources Branch had no clear ongoing arrangements for the evaluation of the effectiveness of the water quantity data system as a whole.

In the area of feedback, and interface with users, the Regions' main evaluation instrument concerning the usefulness of water quantity data consists of analyzing the requests received, (e.g., by mail) according to their source.

The research facilities and major installations at the NWRI are excellent. However, it was noted, and confirmed by others afterwards, that the hydraulicslaboratory facilities, which are particularly spacious, are not fully utilized, apart perhaps from the current meter calibration tank. For the water quality work there are several excellent laboratory installations capable of carrying out specialized and routine chemical analyses. Resources for these water quality labs are 60 person years and $2.4 million.

As far as is known, there is little, if any, contracting out, of the data collection activities of IWD.

ASSESSMENT

The federal role in water management - in an unclear jurisdictional situation, Environment Canada has found a pragmatic way to work in co-operation with the provinces to the advantage of both. This is demonstrated through agreements for water quantity, with all provinces, and for water quality with one province, so far.

The two activities of water management data and water management research, are critical to the sound management of inland waters.

The main users of IWD services, such as the IJC, the Prairie Provinces Water Board, the Prairie Farm Rehabilitation Administration and National Health and Welfare have no complaints to make about the quality or timeliness of the data which they receive and use.

The water quantity (hydrometric) agreements have proven to be excellent instruments for both parties. It is also considered that the existence of such bindin; short term (18 months) commitments protects and even reinforces, the pertinent mandates (and therefore, the allocation of resources) of each of the provinces and of the Water Resources Branch of IWD).

The existing cost-sharing agreements permit a province to operate the federal components on a cost-recovery basis. Only Quebec has chosen to do so. If all the provinces chose this option, this would obviously save significant person years for the federal government, but would undoubtedly cost about as much, as payments to the provinces. It also appears that the provinces (other than Quebec) are unlikely to be interested in that alternative.

Only Quebec, so far, has signed an agreement on water quality. It would appear that the long delays in getting agreements with the other provinces are due to funding or other problems within the provinces themselves, rather than due to internal IWD issues. In the meantime, IWD has managed to operate some provincial stations on an ad hoc basis, and is even able to include Ontario provincial data on NAQUADAT.

Considering that one of the 'leitmotifs' of the Nielsen Task Force guidelines is 'integration', wherever it can be usefully effected, it is striking indeed that there is so little integration of the two main networks (quantity and quality) of the two branches (Water Resources and Water Quality) of the IWD. The reasons given for operating the two networks almost completely independent of each other, may be valid up to a point, but surely, the ultimate benefits of more or much more (but not necessarily complete) integration are worth considering, even if the inherent problems are many. It would likely be beneficial for the IWD, in the long run, if it were done.

Because of the preceding relative 'isolation' of the two networks, the technicians involved are also necessarily trapped, each in their own career path, and this is also considered to be rather abnormal within the same Directorate. If each network was very substantial and each employed a large number of technicians, then separate career streams might make sense. In the present context they don't seem to. There ought to be many opportunities and even planned mechanisms to permit one group of technicians access to the other, more specialized (and therefore of a higher pay classification) group.

If one accepts the principle of 'integration' where justified, then further integration between Services of the same department (say, IWD and AES), in the operation of their networks is highly desirable. Because of the nature of the operations of AES and IWD and specifically because of the differences in the geographic locations, in the permanency of the instrumentation and of the staff, of the timeliness and communications, etc., there are only limited opportunities for integration of complete stations of IWD and AES. On the other hand, there are plenty of opportunities for meteorological installations at IWD stations (even if the reciprocal is not true) and AES and IWD management at headquarters ought to pursue this aspect of co-operation with vigour. For AES, this might even satisfy requirements for additional automatic climate stations.

As noted in the Observation part of this report, both IWD and AES are involved in gathering data on snow depth surveys. There is thus, some potential duplication of effort and an opportunity therefore exists to consolidate and streamline the direction, and co-ordination of snow data activities. With the natural lead role of AES in meteorological activities coupled with the decreasing role of IWD in the snow survey activity it would make sense for AES to assume the direction and coordination in question.

The number of Native people employed as technicians operating and servicing the networks of the Water Resources Branch is rather limited, particularly for an activity which extends throughout the regions where Native people live. Employing Natives would not only solve sometimes acute staffing problems for isolated areas but would also satisfy federal government objectives vis-à-vis Native employment.

Because groundwater is basically a provincial resource and usually a very localized source of water at that, the federal role, if any, ought to be identified and clarified. Current transboundary groundwater issues are not being adequately addressed. To properly manage groundwater, information will be required on the quantity (including recharge rates), and quality of the resource. To address this would require the federal government to negotiate with the provinces to draw up standards for the logging and testing of all productive water wells drilled. If the federal government is to be involved in national groundwater management, it will be necessary to work co-operatively with the provinces.

The substantial resources in the Water Planning and Management Branch dedicated to international and interjurisdictional waters, mentioned above (the Observations part), undoubtedly can be justified to handle the business generated by 30 boards and committees under IJC, and 19 others under federal-provincial agreements. However, it is perhaps time that someone address the sheer magnitude, or the need, for all of these negotiating instruments with a view to streamlining and simplifying the overall processes.

The striking anomalies in the allocation of PY resources amongst the Regions undoubtedly can be justified. It would be very appropriate and timely, however to re-examine the breakdown of allocated resources to make sure that the factors which gave rise to those figures in the first place, are still valid . If not, a medium- to long-term corrective plan should be prepared and eventually implemented.

Because of the cost-sharing agreements with the provinces in network operations, it would not be appropriate to cost-recover from governments; however, there is an opportunity to recover costs for private sector users of IWD outputs.

Concerning the Auditor General's comment that the Water Resources Branch did not systematically evaluate the effectiveness of the water quantity data system as a whole, this is obviously a gap in the management process which ought to be filled. Data should be evaluated to adjust to the needs or requirements, and required changes made to the processing for, and distribution to users.

The feedback and communications with the users are essential control features of the management process. The Regions' evaluation of the usefulness of data to the users by analyzing the requests received (e.g. according to their source) is largely passive in nature. A more active process, such as face-to-face evaluation would be more appropriate, in line with sound marketing procedures. In other words, IWD ought to be more 'service-oriented' towards the users.

With respect to the excellent, yet obviously underutilized hydraulics laboratory facilities at the NWRI of the CCIW in Burlington, the IWD should endeavour to render them accessible to universities, other government departments, other levels of government, and to private industry, or else privatize them. It is recognized that efforts have been made in the past to make those facilities available to the private sector, but to no avail; however, renewed efforts ought to be made to use these reputedly best hydraulics laboratory facilities in North America, more effectively.

There is a real opportunity for the WPB National Laboratory at Burlington, to contract out part of the analytical work on water quality done in its laboratories, to the private sector. About one-half million tests are conducted annually. It may well be that the very specialized analyses requiring sophisticated and very expensive equipment ought to be retained by the federal government. However, all the routine and even some specialized analytical work that can easily be carried out by the private sector, ought to be. The savings may, however, only be in person years.

LANDS DIRECTORATE

Environment Canada

OBJECTIVES

The Lands Directorate has formulated its objectives as:

a. to promote wise land use and management of Canada's land in order to contribute to substainable economic development of Canada and to ensure an environmentally sound economic development across the land;
b. to advance knowledge of land capability and use; and
c. to promote policies for supporting the wise use of land and for solving land issues.

AUTHORITY

The legislative framework for the Environment Canada program is provided by the Constitution Act, the Government Organization Act and the Department of Environment Act.

DESCRIPTION

The Lands Directorate is made up of two "operational" programs: the Land Use Policy and Research program and the Land Monitoring, Evaluation and Data Systems program.

The Land Use Policy Research program: Research is conducted into major national and regional land problems to inform the public and decision makers of their causes, solutions and importance to the nation. Programs to analyze the loss of agricultural land, the preservation of special resource lands, and federal involvement in the solution of land-use problems are undertaken. Examples of current initiatives are the analysis of stress on the land resource, analysis of planning measures and their effectiveness across Canada, analysis of the abandonment of marginal lands, the rehabilitation of mining sites, and evaluation of the impact of federal programs on the nation's fruitland resource. This program also provides for representation of Environment Canada at the meeting of the Treasury Board Advisory Committee on Federal Land Management, where up to 500 proposed land transactions are reviewed.

Land Monitoring, Evaluation and Data Systems: Land use change, and the degradation and loss of prime resource land are monitored through the Canada Land Use Monitoring Project (CLUMP) and are reported on. In Northern Canada a series of Northern Land Use Information maps are being compiled and published at a scale of 1:250,000. These maps are intended to facilitate environmentally sound and well-planned developments, particularly those related to mining activities, petroleum exploration and related transportation. This program maintains the Canada Land Inventory series of maps, it is also preparing an all-Canada ecological data base. This data base and many others make up the Canada Land Data System.

The Lands Directorate (LDS) participates in integrated programs having to do with pollution at a national level and other environmental concerns. These are Toxic Chemicals, Long Range Transport of Airborne Pollutants, and Environmental Assessment and Baseline Studies. Accordingly, LDS is engaged in coordinating research, baseline inventories, and initiating activities on environmental issues which are of cross-sectoral concern.

BENEFICIARIES

The primary users of LDS information include Environment Canada and other federal government departments and agencies who are provided with information and advice on land use issues, resource development, land management, etc.

Through the publication and sale of maps and reports and the distribution of the newsletter "Land" the directorate does provide information to the general public. The number of requests for maps and reports is about 13,000 per year.

Professional organizations require data and information to support teaching, consulting, research, etc. Industry requires similar information to guide resource development, particularly mining and petroleum exploration and development.

EXPENDITURES ($000s)

		82-83	83-84	84-85	85-86
Salaries	a	2,694	2,761	2,280	1,983
	b	1,305	1,102	953	1,086
Capital	a	160	117	98	88
	b	22	18	--	10
Grants and Contributions	a	65	451	44	--
	b	--	78	14	--
Other operating	a	2,258	2,198	2,106	1,852
	b	488	324	438	604
TOTAL	a	5,177	5,527	4,527	3,923
	b	1,815	1,522	1,405	1,700
Revenue	a	275	417	476	475
	b	--	--	--	--
TOTAL	a	4,902	5,110	4,052	3,448
	b	1,814	1,522	1,405	1,700
Person-Years	a	88	84	61	50
	b	38	25	22	26

Notes (1) a) Land Monitoring and Evaluation Data System
b) Land Use Policy and Research
(2) Management and administration expense has been prorated and included.

OBSERVATIONS

The 1985/86 person years and budget ($000) in LDS are distributed as follows:

Land Use Policy & Research	24	1,561
Land Monitoring Evaluation & Data System	37	2,633
Management & Administration	5	430
Integrated Programs	9	599
TOTAL	75	5,223

The Land Monitoring Evaluation and Data Systems program maintains 10 person years in the regions, an average of 2 person years in each region. All other person years are

Ottawa based. It would appear that about 12 person years are expended on CLUMP. The re-printing and distribution of Canada Land Inventory (CLI) maps is a minor activity. The Northern Land Use Information System (NLUIS) mapping is supported by Indian Affairs and Northern Development and Environment Canada with participation from at least five other federal and territorial government departments or agencies. Over 90,000 of these maps have been sold.

The CLUMP program envisages the monitoring at five or ten year intervals of land use change associated with Urban-Centred Regions, Rural Areas, Prime Resource Lands, and Wildlands. Of these four components the Urban-Centred Regions monitoring is fully operational, as is the fruitlands aspect of Prime Resource Lands, the wetlands and prime forest lands aspects of Prime Resource Lands are reported to have recently become operational and methodology for the Rural Areas is still being developed. The fourth component, Wildlands, has apparently been dropped.

Basic information on land use change related to the larger Urban Regions in Canada can be obtained from city planning authorities.

The three LDS programs covering pollutants and baseline studies are certainly important to society and some early and solid results are badly needed by our negotiators at the international level. These three programs are budgetted at 9 person years and $600,000. A close scrutiny indicates that three of the person years cover non-LDS personnel. One of the duties of LDS is to coordinate activity under these programs within DOE.

One of the objectives of the Land Use Policy and Research program is to develop and implement by 1986 a land conservation strategy to arrest land degradation and meet land conservation needs. The Land Resource Research Institute (Dept. of Agriculure) is active in the area of land use and evaluation, and in particular is concerned with land degradation. The LRRI carries out cartographic work for the Lands Directorate and receives funding to cover three person years. The Prairie Farm Rehabilitation Administration (Dept. of Agriculture) has been active in land conservation for fifty years working in a region which has 80 per cent of Canada's agricultural land.

ASSESSMENT

The information gathered by the Land Monitoring, Evaluation and Data System program is undoubtedly useful, however, it is obviously not essential. The NLUIS series of maps are reconnaissance in nature and are only useful for preliminary planning. The CLI maps are uniquely useful as a national inventory, but are not in sufficient detail for the individual farmer. The CLUMP program monitors what is happening to our prime resource land, but does not prevent further conversion of high capability agricultural land from rural to urban use. The sensitivity maps produced for eastern Canada show the regions most susceptible to damage from acid precipitation. This is of interest, but does nothing to correct the problem nor even to document the damage.

The Canada Land Data System must be, by now, a valuable source of information. The Data System itself would be more useful if it was located with other land related information systems, similarly formatted and preferably using similar hardware.

The 15 NLUIS maps of South Baffin Island will be published shortly and the research and inventory of the 25 maps of Central Baffin Island will be completed by September. There are 50 maps remaining to complete the series, covering the Western High Arctic and Ellesmere Island. These last two areas are low priority. The present plan calls for completion by 1989.

REMOTE SENSING

Energy, Mines and Resources

OBJECTIVES

1. To improve remote sensing technology.
2. To make it easier to acquire and disseminate remotely sensed data and derived information needed to manage Canadian natural resources and monitor human economic activity.
3. To assist the development of the Canadian remote sensing industry.

AUTHORITY

The Canada Centre for Remote Sensing (CCRS), a branch of Energy, Mines and Resources, was established in February 1971 (T.B. Minute 702770) to co-ordinate and fund research in the field of remote sensing of natural resources and the environment. CCRS operates under the mandate of these statutes:

a. the Department of Energy, Mines and Resources Act, R.S.C. 1970, c.E.-6, as amended by the Government Organization Act, R.S.C. 1970, c.G-14 (2nd Suppl.); and
b. the Resources and Technical Surveys Act (1966-67, c.25, s.31) R.S.C. 1970, c.R.-7 as amended by the Government Organization Act, R.S.C. 1970, c.14.

DESCRIPTION

Remote sensing involves acquiring earth science information by infrared and other photography, by radar, by laser and by other sensing techniques. CCRS works with federal departments, provincial governments, universities and industry to develop and exploit remote sensing technology.

The Centre owns three aircraft specially equipped for sensing by radar, photography and other remote sensing devices. The aircraft are flown and maintained, under contract, by a private aviation company. CCRS uses the aircraft to acquire airborne data requested by users, and to develop and demonstrate new sensors.

CCRS operates a ground receiving station at Prince Albert, Saskatchewan, to receive signals from U.S. earth-observation satellites. It is preparing to receive data also from the French SPOT satellite and the European Space Agency's ERS-1 satellite.

The Centre's Research includes the development of microwave (radar) devices capable of providing ice reconnaissance information for Arctic and offshore operations in fog, cloud and darkness; laser devices for charting shallow coastal waters; and electronic sensors capable of providing high-resolution images in the visible and infrared part of the spectrum.

The CCRS data acquisition division (36 person years) is responsible for gathering remote sensing data. This division runs facilities to receive, process and store satellite data and monitors and controls the satellite data production systems. Its other sections handle aircraft operations, airborne systems maintenance, sensor development, and the microwave research CCRS is doing in support of the proposed Canadian Radarsat satellite program.

The Centre's digital methods division (48 person years), which operates its computer systems, also develops new digital processing methods and digital methodology for applications; its applications technology division (18 person years) works with users to promote practical applications of remote sensing data; and its Radarsat Office (26 person years) handles analysis and direction of that project and the plans for receiving data from the ERS-1 satellite.

The Interagency Committee on Remote Sensing, the senior co-ordinating body for the national program on remote sensing, advises on policy and financial matters. Its members include assistant deputy ministers from interested government departments. CCRS also works with the Canadian Advisory Committee on Remote Sensing, composed of provincial representatives and heads of specialty centres and other organizations.

In March 1978, the Canadian and U.S. Ministers of Agriculture signed an agreement to co-operate in the development of space remote sensing for global crop information. CCRSA is specified as a participating agency.

BENEFICIARIES

Beneficiaries include federal and provincial agencies involved in forestry, agriculture, water management, land management, revision mapping, land oceanography; exploration companies; and companies making or using remote sensing equipment and data.

EXPENDITURES ($000s)

	81-82	82-83	83-84	84-85	85-86
Salaries & Wages	3.3	4.1	4.6	5.2	6.2
Other O&M	9.4	11.4	10.2	12.2	17.5
Capital	5.0	13.4	13.4	11.5	13.7
Grants & Contributions	1.3	2.3	1.4	4.1	7.7
TOTAL	19.0	31.2	29.6	33.0	45.1
Revenue*	0.7	0.5	0.7	0.8	0.7
Person Years	106	124	118	148	147

* Revenue goes to Consolidated Resource Fund

OBSERVATIONS

CCRS has demonstrated great leadership in promoting the development of remote sensing technology, through technology transfer agreements with the provinces, its research, and its data receiving, processing and distribution.

Many present and potential users of remote sensing data show genuine interest in making increased use of this type of information. However, there appears to be some uncertainty, and in several instances skepticism, about whether the data collected will live up to the claims of many enthusiasts, at least using present technology. For instance, foresters want to find economic ways of assessing how much usable wood they have and will have. They say they need to know the species, the maturity of the trees, the existence of infestations, and "vigour" of the forest under their control. They question whether the facilities now planned can provide this vital information. In agriculture, there is doubt that accurate differentiation between crops, their health, etc., will be provided. As experience is gained in using remotely sensed data, there likely will be increasing confidence in interpreting the imagery, and increased usefulness will result.

Present airborne operations of CCRS involve use of three aircraft. The government provides the CCRS hangar at Uplands at no cost to CCRS. CCRS pays for the fuel. The size of the annual payments to the firm which supplies the crews, ground staff, maintenance, etc. (roughly $1.8 million a year) probably deserves some examination, in view of the relatively small number of hours flown (700-800 per year).

Radarsat, the program to place a remote sensing satellite in polar orbit early in the next decade, is receiving large funding ($19 million in the present Phase II assessment and design work, and $300 million-plus if the project is given the go-ahead). This Canadian undertaking will help industry and government gain more experience in the space field, a laudable objective and one that fits in with the government's long-term priorities. However, the quality and usefulness of the information that Radarsat will provide deserves further study. The cost-benefit analysis produced for the Radarsat project in 1983 is undergoing re-examination in view of the changes in the circumstances since the study was done and perhaps this study will throw more light on how the Radarsat's original hopes look now.

ASSESSMENT

Monitoring of ice in the Northwest Passage was a key element in the decision to consider the Radarsat proposal. The urgency has greatly diminished since this decison was taken. The operations for which ice reconnaissance is needed can be handled adequately by present government and private agencies. There are indications that even the present ice monitoring could be done more cheaply, without increasing the hazards to people and equipment.

Alternate ways of Canada participating in the space program are being investigated by the government. The Radarsat project and the space station project are the two main contenders, but in assessing the remote sensing information to be gained from these two, there should be an analysis of how the cost and quality of this information compares with the cost and quality and availability of the same information from other suppliers, foreign and domestic, airborne, satellite and ground. Also in the analysis should be a provision for the costs of ground truthing the remotely sensed data.

More frequent calling for tenders for the supply of air, ground and other services for CCRS airborne operations, perhaps every three years, might provide greater assurance that these costs are reasonable.

The survey taking, data collection, data processing, marketing and distribution of the CCRS operation might logically be separated from the purely scientific activities it carries out. There appears to be a need for increased emphasis on the development of markets for the data already available. The science side naturally focuses on new ways of gathering more data. Splitting the research from the regular "production" operation would permit tighter budget control of both parts.

LAND RESOURCE RESEARCH INSTITUTE

Agriculture Canada

OBJECTIVE

To provide integrated information on the distribution and quality of Canada's agricultural and other land resources.

AUTHORITY

The Department of Agriculture Act, R.S.C., 66, s.1.

Within the Department of Agriculture, the Land Resource Research Institute was established April 1, 1978 by combining the Soil Research Institute and the Agrometeorology Section of the Chemistry and Biology Institute.

DESCRIPTION

The Land Resource Research Institute (LRRI) is a component of Agriculture Canada's Agri-Food Development Program -- more specifically the activity relating to Research on Natural Resources.

The Institute is responsible for national soil surveys, land use and evaluation, and agrometeorology programs, with its headquarters located in Ottawa. It has eleven soil survey units located across the country in British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Quebec, Nova Scotia, Prince Edward Island, New Brunswick, Newfoundland and the Yukon. Work is ongoing in all the provinces and territories. The headquarters in Ottawa provides centralized support to the soil survey operations in cartography and research. Also, located in Ottawa are the Land Use and Evaluation and Agrometeorology Sections. The former does research and provides information to evaluate agricultural production potentials and degradation hazards of alternate agricultural land uses. The Agrometeorology Section does research and provides information to agricultural authorities throughout the country on the detailed relationships between agricultural production and operations and the weather (and climate).

In terms of overall resource utilization approximately 80 per cent of the person years are devoted to the Land

Resource Inventory operations (soil surveys and support), 10 per cent to Land Use and Evaluation and 10 per cent to Agrometeorology. It has been stated that land use and soil conservation concerns rank second only to farm finances in Agriculture Canada priorities.

The main priority activity of the Land Resource Inventory Operations is to document the distribution and properties of soil resources in Canada. This is an ongoing activity throughout the country which is being met through the conduct, on a systematic basis, of soil surveys carried out to national standards. The Canadian Soil Survey Committee is the joint Federal-Provincial National Committee responsible for classification and mapping techniques. A most significant feature of the survey operations is the close co-operation between federal and provincial soil surveying staff most of whom are co-located in regional offices. The co-operation is such that leadership in various survey activities may be given by federal officers in one province and provincial officers in another. In some parts of Canada, tripartite arrangements have evolved with university staff playing an important contributory role to federal-provincial activities -- e.g. Institute of Pedology located at Guelph University.

Planning of survey operations is not a nationally "top-down" organized activity - rather the priorities are largely set "locally" in the provinces and are related to the resources available from the respective groups. Staff transfers of federal employees between provinces occur occasionally according to the urgency of survey needs.

The principal products of soil survey operations are maps drawn from a digitized data base - they are produced in LRRI in Ottawa and published by the Surveys and Mapping Branch of EMR. They are available from provincial and university departments at a nominal charge with revenues accruing to the provinces. The soil surveys maps produced by the Institute are used by the staff as a basis for various interpretations with respect to land use options and potentials, soil degradation potential, drainability, and land evaluation and assessment. The maps derived from the basic data for these purposes are an important part of the Institute's activities.

The scale of mapping is variable across the country and is related to the specific needs as they arise in the provinces. Thus, in PEI, detailed maps are available at a scale of 1:5000 while in the Prairies and the Yukon maps are at a scale (generally) of 1:125000

Land Use and Evaluation efforts are devoted towards (i) the development of the soil, climate and land form, agronomy and economics data bases and methodology, (ii) soil degradation in its many forms and (iii) modelling efforts relating crop yields to soil resources (physical/chemical). This section and the Land Resource Inventory cooperate with Environment's - Lands Directorate on the common use of their respective data bases. LRRI also carries out cartographic work for the Lands Directorate and receives funds to employ full-time staff (3 person years).

Agrometeorological resources are used to provide improved information services to the agricultural community; to demonstrate the usefulness of agrometeorological parameters and indices to farmers; and, to examine existing and potential climatic effects on agricultural lands. Considerable effort is also devoted to the preparation of yield estimates and wheat and other crops during the growing period, and to the overall moisture status of the prairies soils throughout the year.

A data base system CANSIS (Canada Soils Information System) is available for general use.

BENEFICIARIES

Provincial authorities (agricultural, forestry, northern development, land assessors), individual farmers, land use planners, the agricultural and forestry industry and community and other federal departments.

EXPENDITURES ($000s)

	81-82	82-83	83-84	84-85	85-86
Salaries & Wages	3,800	4,600	5,000	5,600	5,500
Other O&M	825	910	1,000	1,200	1,200
Grants	-	-	-	-	-
Capital	238	365	652	850	1,000
TOTAL	4,863	5,875	6,652	7,650	7,700
Revenue	-	-	-	-	-
Net Cost	4,863	5,875	6,652	7,650	7,700
Person Years	155	156	154	154	154

OBSERVATIONS

The major part of the operations of the LRRI are highly decentralized with more than sixty of the soil survey staff being in the regions. Organizationally, LRRI can be said to be unencumbered by central policy and administrative bureaucracy. Planning is largely carried out where the action is leading to an organization which is highly responsive to the needs as they are seen around the nation. Pragmatism rules the day. It must be stated, however, that national standards for survey work are set and carefully controlled by the Ottawa headquarters.

By and large the Institute is keeping abreast of technology in the development of digitized cartographic data bases and map production. It retains a long-standing relationship (obligation) with the Lands Directorate (EC) in cartography.

The demand for soil surveys exists on two levels (i) to complete the basic surveying and mapping of known and potential agricultural lands in Canada, and (ii) to respond to more immediate requirements such as soil conservation, land use and planning, etc. at the local level. These latter pressures delay the prime task of completing the basic survey (estimated 25-30 years for completion) as perceived at the national level.

Additional funds are being channelled into soil survey and related activities through recent Federal-Provincial Development Agreements related to Agriculture. These funds, while administered through LRRI, do not appear in the Institute's budget. They are used on contract activities with the private sector.

Work has not been contracted out to any significant degree by LRRI except most recently as mentioned. There appears to be a competent, if limited, private sector which is not being utilized to its potential capacity. Some provinces seem to have a similar philosophy with respect to contracting out while others employ the private sector in a substantial way.

ASSESSMENT

In spite of what might be perceived as a lack of the most careful management practices in the operations of the Land Resource Research Institute, the organization is working well and meeting its objectives in light of continuing pressures on its resources.

The extent of Federal/Provincial/University co-operation is something unique in Canadian experience. It is a feature which might well be developed in other technical-scientific areas where greater co-operation should be the order of the day. There is, however, one serious criticism of the arrangement in that the private sector is not a partner in these operations.

Contracting out, emanating from the Make or Buy Policy of the 1970s, has not been pursued to the degree that it might have been. A more conscientious effort must be given to this aspect of the operations of LRRI - an effort which would probably lead some provincial authorities along the same track.

The relationships with the Lands Directorate (EC) are a hangover from earlier times. Overlapping cartographic requirements and the general similarity of some of the mapping activities suggest the possibility of combining the two organizations. Lands Directorate (EC) has a cross-sectoral mandate while LRRI activities are directed principally to the provision of land and climate information which contributes to sustaining agricultural and forest production in the country.

Research carried out in LRRI is very much applied research relating almost entirely to the operational elements of the Institute. This is typified by the various classification groups in the organization. The linkage with survey operations appears to present a very good working model.

A fundamental question might be raised as to why the federal government should be active in this manner in an area for which the principal responsibility rests with the provinces. There is little doubt that soil survey work etc. would proceed should the federal government decide to withdraw. On the other hand, the history of the involvement suggests that the provinces welcome the contribution of the federal government in these activities and would be displeased if circumstances changed. There are obvious federal interests in the overall national capability of soils to maintain agriculture and other land uses.

FORSTATS - CANADIAN FORESTRY STATISTICS PROGRAM

Agriculture Canada

OBJECTIVE

To publish, at regular intervals, national statistics relating to forestry in Canada.

AUTHORITY

The Forestry Development and Research Act (1966-67, c.25, s.26).

DESCRIPTION

Under the Forestry Development and Research Act, 1966-67, the Canadian Forestry Service now in Agriculture Canada but formerly in Environment Canada "may conduct economic studies relating to the forest resources, forest industries and marketing of forest products ----".

The FORSTATS program activity is conducted at the Petawawa National Forestry Institute and is responsible for the acquisition, summary and publication of forest resource data at the national level. There are two principal components to the program: (i) production of Canada's Forest Inventory and (ii) development of national statistics on "change data", i.e., deletions due to harvesting, damage etc., accruals resulting from growth, management activities to protect the resource (silviculture) and changes in land ownership which impact on the use of forests for wood fibre production.

The FORSTATS program was established through a Treasury Board decision in 1981 which created the Forestry Statistics and Systems Branch. National Forest Inventory information is published at five-year intervals with the first publication of "Canada's Forest Inventory " occurring in 1981.

Forests in Canada are the principal responsibility of the provinces. The federal government is responsible in a similar way for those forests in the Territories and on federal lands within the provinces. Data for the national forest inventory is generated principally by provincial authorities. FORSTATS aggregates the information and recodes it to a national grid.

Information and data relating to worldwide forestry resources and activities are also collected under FORSTATS.

BENEFICIARIES

Principally policy and decision-makers in the federal and provincial governments responsible for the integrated management of this key national resource. Major industries in the pulp and paper industries, forest products will find this information to be of value in broad terms.

EXPENDITURES ($000)

	81-82	82-83	83-84	84-85	85-86
Salaries & Wages	683	849	1,048	927	544
Other O&M	316	744	890	1,004	252
Grants	--	--	-	-	-
Capital	65	470	360	461	-
TOTAL	1064	2063	2,298	2,392	796
Revenue	--	--	-	-	-
Net Cost	1064	2063	2,298	2,392	796
Person Years	22	25	26	26	14.5

(Notes: The reduction in resources from 1984/85 to 1985/86 results from the splitting of the Forestry Statistics and Systems Branch into the two programs FORSTATS and Forestry Data Systems. The data systems group continues to serve FORSTATS but also provides service to the National Forestry Institute at Petawawa).

OBSERVATIONS

The program, in existence for five years is extremely dependent on co-operation with provincial authorities for the development of the national forestry data base. The Canadian Forest Inventory Committee is the key co-ordinating body. This Committee is composed of federal and provincial officials and is responsible for the necessary co-ordination and the establishment of standards. Co-operation with the U.S. Forest Service is maintained through their representation on the Committee.

The federal data base is digitized while provincial data bases are in the process of being brought into a similar format. Concurrent "change data" accumulation is similarly computerized and is essential to the maintenance of the national inventory. Continuing development in FORSTATS is important to the provinces as an aid to their management decisions.

Treatment of input data from provincial authorities must be handled carefully, recognizing the proprietary, competitive and economic implications of the information.

Statistics Canada assists in the cartographic presentations of the information presented in the Canada Forest Inventory in thematic form. Statistics Canada also produces survey information on forestry but only in terms of the economic factors, financial state of the industry - etc. (i.e., surveys of the forest sector after the wood is cut). The services of Statistics Canada are provided through contract with the Canadian Forestry Service.

ASSESSMENT

From a national policy perspective FORSTATS is an essential element in any decision regarding the exploitation of this important national resource. The expenditure for the program would seem to be minimum when compared to its importance.

It is debatable that the work for FORSTATS is being conducted in the best organizational framework. Because of its strategic value to policy and economic decisions, it should be transferred, preferably to the economic sector of the Canadian Forestry Service. Alternatively, it could be considered for transfer to Statistics Canada although this is not deemed to be the ideal alternative. The easy availability of modest computer services is important to the FORSTATS program as is the co-operation with provincial chiefs of forest inventory.

It is important that the FORSTATS organization be in close contact with other resource survey activities in the federal and provincial governments, i.e. soil surveys, land management, geological surveys to ensure economy of resource utilization and avoidance of overlaps in thematic mapping.

No major changes in the resourcing of this program should be made.

GEOLOGICAL SURVEY OF CANADA

Energy, Mines and Resources

OBJECTIVES

To ensure the availability of comprehensive knowledge, technology and expertise pertaining to the geology of the Canadian land mass and offshore areas, including mineral and energy resources and conditions affecting land and seabed use, as required for the effective exploitation of mineral and energy resources, effective use of land, estimation of the resource base of Canada and formulation of policies.

AUTHORITY

The Resources and Technical Surveys Act, R.S.C. 1970, C.R. 7, as amended by the Government Organization Act, R.S.C. 1970.

The Department of Energy, Mines and Resources Act, R.S.C. 1970, as amended by the Government Organization Act, R.S.C. 1970.

DESCRIPTION

The Geological Survey of Canada (GSC), founded in 1842, is one of four Branches which comprise the Earth Sciences Sector of EMR. The GSC undertakes the conduct of geological, geophysical and geochemical research and surveys; estimation of mineral and non-renewable energy resources; investigation of geological phenomena affecting engineering works and the environment; development of geophysical and other technologies; development of national geoscience standards; the fostering of Canadian geoscience and Canadian international geoscience activities; cooperation with the provinces; provision of advice to government; and, production and dissemination of maps and reports.

In 1984-85, the GSC was organized into eight divisions across the country. Some of these divisions pursued responsibilities which were national in scope, e.g., Economic Geology and Mineral Division, while the others confined their responsibilities largely to regional matters e.g., Cordilleran Geology Division which studies the composition, age, distribution and origin of the rock of British Columbia and the Yukon and Canada's Pacific offshore territory.

Geological Survey of Canada - Divisional Organization

Division	Location	Person-Years (83/84)
Cordilleran Geology	Vancouver, B.C.	44
Sedimentary and Petroleum Geology	Calgary, Alberta	141
Precambrian Geology	Ottawa, Ontario	75
Economic Geology and Mineralogy	Ottawa, Ontario	52
Resource Geophysics and Geochemistry	Ottawa, Ontario	96
Terrain Science	Ottawa, Ontario	65
Geological Information	Ottawa, Ontario	98
Atlantic Geoscience Centre	Dartmouth, N.S.	103

In 1984, the Central Laboratories and Technical Services Division in Ottawa (49 person years) was assigned to the two divisions having the major requirements for its services. Thus, the Chemical and Mineralogical laboratories were assigned to the Economic Geology and Minerology Division, and the smaller technical shops were assigned to the Resource Geophysics and Geochemistry Division.

The GSC is largely a field-oriented scientific organization which conducts systematic examinations and mapping of the Canadian land mass, and its associated hazards. It has a marine institution (Atlantic Geoscience Centre) carrying out similar systematic geologic and geophysical examinations in the Atlantic and eastern Arctic oceans and a unit at the Pacific Geoscience Centre in Sidney, B.C.

In performing its tasks the GSC develops the broad fundamental information which is the underpinning of the continuing development of the oil/gas/coal and mineral industries in Canada. Considerable co-operation takes place with the private sector and provincial authorities where more specific capabilities exist to satisfy their own particular requirements. An Industrial Advisory Committee on Earth Sciences provides key advice to the sector, including the work of the GSC. The Canadian Geoscience Council provides, on a regular basis, more focused reviews of the work of the GSC. These advisory committees are composed of members representing the mining and petroleum industries, provincial governments and the universities.

Information from GSC work in the form of reports, papers and maps is generally available. Open File compilations of recent data can be purchased or consulted by interested parties as required. Sales of information (and rock sets) through sales offices across the country have been fairly constant over the past eight years at about $190,000 per annum.

BENEFICIARIES

Include the oil/gas/coal and mineral sectors of the economy, provincial governments, universities, AECL (Nuclear Fuel Waste Management and uranium assessment), other federal goverment departments, the general public and the international science community.

EXPENDITURES ($000)

	81-82	82-83	83-84	84-85	85-86
Person Years	763	775	800	805	831
Salaries and wages	26,400	30,245	32,577	35,400	38,452
Other O&M	12,972	17,322	17,996	29,519	41,717
Capital	1,574	2,419	3,028	5,222	5,346
Grants	43	43	43	0	0
Contributions	0	0	810	63	0
Revenue	141	224	368	198	167
TOTAL	41,130	50,253	54,822	70,402	85,772

Note: Resource totals exclude Financial Management Branch component of the GSC for 1983-84 onwards (@ $240K and 7 person years annually).

OBSERVATIONS

A comprehensive A-Base Review of the Geological Survey of Canada operations was completed in 1983. The Canadian Geoscience Council produced comprehensive examinations of Survey activities in 1978 and 1982 and is currently reviewing two division components of the Survey program. Since 1982, the Independent Industrial Advisory Committee on Earth Sciences has advised the Deputy Minister, EMR on its view of a number of programs of the GSC and significant program changes have resulted. Internally, the Program Review and Audit Branches reported on the GSC in 1982 and 1981 in a series of reviews.

The Geological Survey of Canada is meeting its perceived principal national responsibilities. More recent socio-economic and political pressures on the work of the Survey are being integrated into the operations, but not without some internal managerial repercussions. Its scientific standing is high both nationally and internationally.

Activities conducted by the Geological Survey of Canada do not overlap substantially with those of other organizations. At the provincial level geological/ geophysical capability is variable from province to province, and thus there is a need for continuing co-operation in a flexible manner so as to obtain maximum benefit from available national resources. The industrial/private sector is highly supportive of the ongoing work and objectives of the Survey.

A most important development affecting the work of the GSC has been the recently signed (although not yet ratified) Law of the Sea. On ratification this will extend the offshore responsibilities of the Survey by an area equivalent to more than one-third of the Canadian landmass. Significant increases in marine geoscience survey activities in the Canadian offshore are thus foreseen for the next several decades. Effective use of national resources will be critical in the conduct of programs in this field.

In recent years the Geological Survey of Canada has acquired substantial additions to their ongoing resources through "external" government funding from a variety of sources such as Energy, Mines and Resources (OERD funds), External Affairs (bilateral boundary funds), AECL (Nuclear Fuel Waste Management) and through DRIE - ERDAs (mineral development agreements with the provinces). By far the majority of such funding is being used in contracting out. In 1984-85, 61 per cent of all operational funds were dispersed in this manner.

The Geological Survey of Canada (as well as other Branches of the Earth Sciences Sector of EMR) has an "aging" problem in the scientific and technical groups. This would appear to have resulted from the large intake in the 1950s and early 1960s. A high fraction of the older community is eligible for retirement.

There appears to be a significant problem with the contracting out policy in the field of scientific services. Timeliness in the placing of contracts is of the essence where fieldwork is restricted to seasonal operations. Further, the policy of lowest bidder is unsatisfactory where quality of work and capabilities of the lowest bidder can be seriously questioned by the funding organization.

ASSESSMENT

Systematic geologic mapping of the Canadian land mass and the offshore is essential to the long term strength of national energy and mineral resource development. In terms of basic coverage, the land-mass South of 60°N has essentially been mapped systematically at the 1:250,000 scale. For northern lands the coverage is much poorer. The offshore areas are sparsely mapped and with enlarged areas coming under Canadian jurisdiction, the systematic geoscience mapping will require many years of surveying to completion (with no changes in resource levels). The disparities in coverage between sediment/superficial geology, precambrian, cordilleran and offshore geoscience mapping requires that the GSC review its branch strategy with respect to mapping in the light of changing priorities. GSC should also develop an overall national plan that is consistent with related mapping activities being conducted within the federal government and elsewhere.

Although arrangements with provincial geological administrations appear to be very good at the working scientist level and a number of committees exist to facilitate the implementation of joint endeavours, the lack of a national strategy toward mapping and resource development would appear to be a serious omission on the part of governments. This has been typified over the years by the ups and downs in federal funding directed toward mineral development. The activities appear to have been driven by factors other than a national strategy.

The Department of Energy, Mines and Resources is conscious of the "age problem" existing in its scientific community and has been taking some steps within the existing managerial system of the Public Service to overcome the problem. Progress, however, is slow and where it has occurred it has been extremely beneficial. In certain divisions of the GSC, however, the problem remains acute and some new and innovative approaches should be examined. A policy change in this area could have immediate effects on up to 80 person years in EMR alone. Some other departments could be equally affected.

The organizational framework of the GSC, (presently eight divisions plus management and common services) when examined from within the Earth Sciences Sector of EMR could benefit from rationalization. Marine interests on both coasts are spread over two branches. The divisions of the GSC have mandates which are regional, national or a mixture of the two, depending on the division. Multi-disciplinary activities, recognized for their productivity, are hampered to a degree by the organization and present collective agreements for scientific staff. A number of these issues have been known for some time and appear to be in need of further review. Resource savings are distinctly possible following readjustments within the scope of such an examination.

EARTH PHYSICS BRANCH

Energy, Mines and Resources

OBJECTIVES

To ensure the availability of geophysical information and expertise concerning the solid earth, its physical process and geophysical hazards as required for public safety and security and for the management of the Canadian land-mass and offshore areas.

AUTHORITY

The Resources and Technical Surveys Act (1966-67, c.25, s.31) R.S.C. 1970, C.R.-7, as amended by the Government Organization Act, R.S.C. 1970, c.14 (2nd Supp.).

The Department of Energy, Mines and Resources Act, R.S.C. 1970, C.E.-6 as amended by the Government Organization Act, R.S.C. 1970, c.14 (2nd Supp.).

DESCRIPTION

The Earth Physics Branch is one of four Branches which comprise the Earth Sciences Sector of EMR. The Branch undertakes the collection of basic geophysical data; the processing of the data into meaningful scientific information; basic research; and the provision of advice and assistance in the resolution of current national problems. The fields of interest pursued are Seismology, Geothermics, Geomagnetism, Geodynamics and Gravity.

Networks of seismological, geomagnetic and geodynamics stations and observations are maintained throughout the country together with their appropriate data bases. Gravity surveys are performed on a selective basis and results are published as Open Files and in the form of gravity maps. Considerable international collaboration takes place in all functions.

Geothermal investigations designed to assess the Canadian geothermal potential are performed together with permafrost studies and heat flow measurements.

The Branch has the management responsibility for the Pacific Geoscience Centre (Victoria, B.C.). The majority of Branch efforts are pursued in Ottawa.

BENEFICIARIES

Include the NRC (Building Codes), AECL (Nuclear Fuel Waste Management), federal energy programs, international science agencies, insurance and construction industries.

Expenditures ($000)

	81-82	**82-83**	**83-84**	**84-85**	**85-86**
Salaries & Wages	6,389	6,937	7,472	7,995	8,237
Other O&M	4,198	5,595	6,607	7,560	5,794
Grants	23	27	22	-	-
Capital	381	742	727	2729	2,998
TOTAL	10,991	13,301	14,828	18,284	17,029
Revenue	130	233	151	60	200
Net Cost	10,861	13,068	14,677	18,224	16,829
Person Years	172	173	172	169	169

Note: The large increase in capital in 1984/85 and 1985/86 results from the T.B. approved Branch Capital Acquisition Plan, designed to overcome obsolescence of old equipment.

OBSERVATIONS

A comprehensive A Base Review of Branch operations was completed in January 1983. The Auditor General, in his report of March 31, 1982, expressed satisfaction with the management of this small organization and indicated that changes in operational plans were being adequately handled within its management framework. A number of ad-hoc review teams examined all scientific programs under way in 1978.

The scientific reviews of the Earth Physics Branch were complimentary in terms of the quality of the effort, bearing in mind the limited resources available. Continued and closer co-operation with other federal institutions, particularly the Geological Survey of Canada was advocated.

In broad terms the programs and issues of the Branch are thoroughly documented. Resources made available have generally been adequate in that a competent and well-managed organization, recognized nationally and internationally has resulted. Management and common service expenses, on the other hand, are relatively higher than in other Branches of the Earth Sciences sector because of organizational differences.

The marine interests and responsibilities of the Earth Sciences Sector of EMR are being met in a co-ordinated, but organizationally cumbersome manner. At the Pacific Geoscience Centre (PGC) on the west coast, the Earth Physics Branch has national network and marine programs. The Geological Survey of Canada through its Cordilleran Geology Division also pursues marine programs in the Pacific from the Centre. The Director of the Centre reports to the Director General, Earth Physics Branch. On the east coast the newer Atlantic Geoscience Centre (AGC) is managed through the Geological Survey of Canada. Earth Physics Branch continues to perform geophysical studies (e.g. seismicity) and gravity surveys off the east coast of Canada, in cooperation with AGC and in fulfillment of their broader mapping responsibilities. The Director of AGC reports to the Director General, GSC.

ASSESSMENT

Information on the physics of the Canadian land-mass and its adjacent offshore areas is valuable to continuing development in an advanced nation. Basic information is being generated in this Branch that is needed in engineering circles for major construction projects throughout the country. In contrast to the survey activities being conducted elsewhere, the extent of the effort in this Branch is modest.

Recognizing the changing policies in the energy development field, the Geothermal Energy Program has a lower national priority than in prior years.

Although program overlaps are not large the amalgamation of the Branch with some restructuring in the Geological Survey of Canada would be beneficial and could produce savings. There would be a more evident and concerted approach to the marine interests of the Department of Energy, Mines and Resources - i.e., in the field of data gathering, data processing and distribution.

Although there is a demonstrated need for seismic, geomagnetic and gravity information, a reduced effort would not have serious consequences for the national requirements.

It has been suggested that because of some commonality of interests between the Geodetic Survey Division of the Surveys and Mapping Branch and a section of the Earth Physics Branch that the two groups be merged. Such a merger would not result in any savings. The present co-operative mechanisms are functioning very satisfactorily.

SURVEYS AND MAPPING BRANCH

Energy, Mines and Resources

OBJECTIVES

To ensure the availability of geodetic, topographic and selected geographic information required for effective resource management, land use and demarcation, engineering works, urban development, transportation, defence and public safety.

AUTHORITY

Resources and Technical Surveys Act 1966-67; Government Organization Acts 1970 and 1979; Canada Lands Surveys Act.

DESCRIPTION

The Surveys and Mapping Branch is one of the four branches of the Earth Sciences sector of Energy, Mines and Resources. It is the federal organization responsible for the mapping of Canada.

The Branch has six divisions:

a. Geodetic Survey, which establishes the basic reference points for all forms of surveying.
b. Topographical Survey, whose maps portray the Canadian land mass in detail, including rivers, lakes, roads and elevations.
c. Geographical Services, which uses the maps produced by the Topographical Survey to derive small scale general purpose maps, The National Atlas of Canada, aeronautical charts and related information.
d. Legal Surveys, responsible for the conduct of surveys on all Canada Lands, which include the Territories, the National Parks, the offshore and Canada's 2,258 Indian reserves.
e. The Canadian section of the International Boundary Commission, which in consort with its U.S. counterpart, monitors the Canada-U.S. boundary and locates any position on the boundary in case of dispute.

f. **Reproduction and Distribution**, which operates the Canada Map Office, and makes available, on a cost-recovery basis, the map data produced by the Branch. It is responsible for the reproduction of maps and charts of EMR and a number of government departments. It also maintains a warehousing and extensive national distribution system of maps and charts. It is required to maintain a map-printing capacity to respond to Canadian needs in a national emergency.

BENEFICIARIES

Governments, industry, transportation, real estate, tourism, the professions - in fact, the whole country. The information provided is basic to informed decision making -- long range and short range.

EXPENDITURES ($000)

	81-82	82-83	83-84	84-85	85-86*
Salaries & Wages	28.4	30.5	32.9	33.7	35.8
Other O&M	14.2	15.6	16.4	17.6	20.5
Grants & Contributions	0.1	0.1	0.1	0.1	0.1
Capital	1.6	1.8	5.2	6.3	8.9
TOTAL	44.3	48.0	54.6	57.3	65.3
Revenue**	3.9	4.1	3.8	3.8	4.6
Person Years	969	933	923	907	907

* Planned (on hold)

**Revenue goes to Consolidated Revenue Fund.

Breakdown of capital expenditures: ($000s)

	Actual 83/84	Actual 84/85	Planned** 85/86
Related to digitizing maps	2,685	1,816	2,529
Geodetic equipment (1)	326	974	1,070
Map printing, distribution(2)	1,688	745	1,379
Miscellaneous (3)	404	317	162
Related to Sherbrooke:			
For digital mapping	nil	1,661	2,500
Miscellaneous (4)	nil	827	1,250
TOTAL	5,103	6,340	8,890

**On hold as of July 15, 1985

Notes on capital expenditures:

1. Includes new inertial surveying system, new global positioning system and related computing and other equipment.
2. Includes new press in 1983-84, and another in 1985-86.
3. Includes vehicles, office equipment.
4. Includes PWC studies, office furniture in 1984-85, land purchase and architects fees in 1985-86.

OBSERVATIONS

The topography of all of Canada has now been mapped on the 918 sheets done to the standard scale of 1:250,000, within the National Topographic System although some of the Arctic maps are sketchy. These are being improved where the 1:50,000 scale mapping has been done (9,798 sheets completed out of the 12,922 required to cover the whole country).

New technology allows the Branch to perform many of its tasks faster, more accurately, with fewer people and to get information in forms more easily exchangeable with other governments. For instance, the Geodetic Survey division of the Branch, which establishes the latitude, longitude and elevation of basic reference points (a national positioning system needed for surveying), by the mid-1950s had completed the location of fewer than half the points needed for a basic survey reference system. Helicopters and electronic survey equipment then speeded up the transportation of people and equipment to the selected sites. Satellites in the 1970s made possible accurate positioning within half a metre. Global positioning system equipment now becoming available offers a predicted accuracy within 10 centimetres, and it's expected only a few hundred "monuments" will be needed for all of Canada to support surveyors using this system. The 8,000 now scheduled to cover the country by 1987 pertain to conventional survey uses of geodetic points.

Not all the technology has changed. In the case of the Geodetic Survey again, the elevations still have to be done using spirit levels at each marker location - very slow compared to the positioning operation. It's estimated that the elevations for all points will take 20 years to complete, at the present rate of the work. Three hundred students used to be hired each summer. Now, mainly because of contracting out more work, only 30 are hired. Permanent staff of the division has been reduced to 142 from 185 in the past decade.

The Canadian section of the International Boundary Commission is a part of the branch, with eleven person-years. It does work similar in some ways to that of the Geodetic Survey and the Legal Surveys divisions. Under a 1908 treaty, the Commission was charged with the maintenance of the boundary. It must approve highways, pipelines, etc. that cross the border - - an activity handled through correspondence normally. The U.S. section comes under the U.S. State Department. The Canadian section's reports go to External Affairs' U.S. bureau, and its funds come from EMR. A 1982 A Base Task Force recommended that the Commissioner and the IBC budget be moved from EMR to External, and that the technical team become an operational unit in Surveys and Mapping Branch. Negotiations between EMR and External officials regarding the merits of such a move were inconclusive.

Contracting out has been an important feature of the Branch's operation in the past decade. Legal Surveys contracts out 95 per cent of its surveys. All the new mapping for the Topographical division is done by private industry to the division's specifications, including all the aerial photography work, the compilation, the photogrammetry, and the cartography. Surveys and Mapping Branch checks the maps, using the same staff that does the monitoring of the contracts. In 1983-84, 292 new sheets were produced in the 1:50,000 series, all contracted out.

On the other hand, the division does almost all the map revisions itself (273 of the 1:50,000 and 71 of the 1:250,000 sheets revised in 1983-84). Outside mapping firms are hesitant to bid on the revision of an existing sheet because they don't know how much work will be entailed unless there's a detailed up-to-date survey available. And if such a survey is done by the division, there's no real cost advantage or saving in person-years if it contracts out the rest of the revision because the main job has already been done.

The 1977 plan to reduce in-house work by 240 person years (out of 704 technical staff) over a 10-year span through attrition was extended to 13 years in June 1983, to permit hiring younger staff with the new skills considered needed to promote future operational effectiveness. Of the 240 person-years, 60 were to come from geodesy (leaving 67), 100 from topographic (to 175), 20 from aeronautical (to 53) and 60 from reproduction services (to 169). In addition to the 120 person years lost in the five years ended March 1983 under the contracting-out agreement, there was a drop of another 44 person years through general budget reductions. The revised program produced drops of only 10 person years of the total complement of the Branch in 1983-84 and 16 in 1984-85. None were scheduled for the current year, leaving a total Branch complement of 907.

The contracting out, being phased in at a rate tied to attrition, left no room for recruiting. As a result, the average age of the technical staff rose from 40 to 43.4 years. The lengthened schedule for reducing person years also reflects the fact that the plan to move the Branch to Sherbrooke involved doing more work in-house than was originally scheduled.

There is increasing interest in digitizing as much of the data as possible. Digitizing makes possible easier exchange and comparison of different types of information received from many sources. It permits automating the map making process, reduces the labour required, and - in theory, at least - makes maps cheaper. In practice, the system adopted isn't cheaper because of the high capital costs involved. One industry estimate is that digital mapping using this system costs two and one-half times conventional mapping. Furthermore, the software to permit automation of the whole cartography job has not been completed.

EMR management three years ago decided to put all 1:250,000 maps in digital form in five years. It bought a scanning system which is now operating at roughly 80 per cent of its rated capacity (250 sheets a year). More sophisticated software is needed to cut down the amount of manual intervention still required.

To encourage private industry to convert to digital, the Branch has awarded contracts to do digital mapping in the North to get experience, and this year is giving three pilot sheets in the South to three separate firms.

The development of the system as now planned involves substantial capital investment by the contractor as well as by EMR. There is some pressure from the industry to get on with completing the less expensive conventional mapping still to be done.

The Department of National Defence Mapping and Charting establishment has a mandate to maintain a capability to support the requirements of the Department of National Defence for maps, charts and field surveys on a global basis. To fulfill their mandate they have 238 personnel on strength including civilians. They meet these requirements by means of exchange agreements with other countries, by making use of existing mapping, by contracting out, by buying existing information and by making use of their own facilities. Their training and field survey capabilities are frequently of benefit to the Surveys and Mapping Branch.

ASSESSMENT

The competence of the survey industry, demonstrated in the new mapping area, suggests that ways could be developed to permit contracting out of the revisions, perhaps by putting up blocks of map sheets for tender so that the risks to the contractors could be spread over several sheets. To help maintain some in-house expertise, perhaps one conventional mapping team and one digital mapping team could be kept on strength in the Branch.

Digitizing does not necessarily require the particular equipment now installed and on order. Until a fully automated system can be put in operation at a competitive cost, an alternate and cheaper solution would be desirable. One approach might be to do the digitizing manually, using relatively low-priced help and less costly capital equipment.

Until digitizing new map production and map revision becomes as cheap or cheaper than conventional map making, the main reason for digitizing is to enable the building of data bases containing a wide variety of geographic and other information. If the industry estimates of the extra costs involved (up to 150 per cent) hold water, only selected areas seem worth considering for digital treatment at this stage. Certainly, there would seem to be much less justification for digitizing maps in the North than there is in the South. A thorough economic analysis is needed before deciding how much digitizing to do, and where and by whom it should be done.

The proposed move of the Surveys and Mapping Branch to Sherbrooke has been deferred in view of its $80 million cost, but it hasn't been cancelled. There is widespread concern in the department and in industry about the significant increase in costs and in person-years that would result if the move goes ahead. One obvious duplication by-product: the need to maintain complete warehousing operations in both Ottawa and Sherbrooke for the large inventory of maps. The new centre would also involve the department's taking back into its own hands operations that had been successfully contracted out to industry. The industry claims that this institute will perpetuate the duplication of staffing and equipment costs and make it difficult for the industry to grow, in Quebec as well as elsewhere in Canada.

The importance of cooperation and coordination between the federal and provincial data collection people becomes very apparent in the survey and mapping field. The information being collected by the Branch for its 1:50,000 scale program has enough accuracy to produce 1:20,000, even 1:10,000 maps. The positioning is precise, although some claim there is less detail than the provinces may require for their 1:20,000 (and larger) scale work. Some provinces would prefer to collect their data and have the federal people buy this information to produce what they need for federal purposes. There is no agreement yet on the correct approach but a volunteer group, the Canadian Council on Surveys and Mapping, is working to devise solutions. Cooperative agreements have been made with six provinces, with more to come. There seems to be a need for a system that forces the various governments and disciplines to keep to standards that make possible easy exchange of data, and to avoid duplication of mapping from a national point of view.

The National Atlas of Canada appears to be a natural vehicle for bringing together up-to-date national information in digitized form on a host of important subject areas. Much of the data is already available, from many different sources in varied formats. If the coordination of varied data from the many governments could be achieved in this operation, it could provide a model for broader cooperation on many fronts.

The Reproduction and Distribution Division sells the Branch's products in map form, but is allowed to make the data available in digital form on only a very limited basis. If the broadest possible use of the information is to be encouraged and if digital data is the way of the future (it's the way of the present in some fields), there ought to be a prompt review of this policy in conjunction with departments and agencies outside EMR. National security, one of the reasons cited for the restrictions, doesn't appear to be a sufficient reason, since the digital data can be developed from the maps (all easily purchased). The main obstacle appears to be a concern about protecting copyright, a reason which also is open to question.

The Legal Surveys Division decided some years ago to reduce its complement in Ottawa and move staff to the regions where it has installed a network of microcomputers linked to its automated data base. This process has been stalled, with most of the Ottawa staff still there. The main reason cited is union objections. A review would perhaps disclose whether all the person-years involved (roughly 150, of whom 100 are in the regions) are still needed, and whether there is any compelling reason to delay further the reduction in the Ottawa staffing. It is recognized that the increased load likely to result from the rising activity in native land claims may require some additional person-years in future.

CANADIAN HYDROGRAPHIC SERVICE (CHS)

Fisheries and Oceans

OBJECTIVE

To help ensure the safe use of Canada's navigable waters through collection, processing, publication, maintenance and distribution of hydrographic information.

AUTHORITY

Constitution Act, Government Organization Act (1979), Department of Fisheries and Oceans Act (1979) and Canada Shipping Act.

DESCRIPTION

The CHS is one of the two components of the Ocean Science and Surveys (OSS) Program of the Department of Fisheries and Oceans (F&O). The other component of OSS deals with oceanography. While the CHS headquarters is under the overall direction of the Assistant Deputy Minister of OSS, it is directly under the Director General, Hydrography (the Dominion Hydrographer). The four regional hydrography components are under the line authority of their respective OSS Regional Directors General, but under the functional authority of the DG, Hydrography. Regional offices are located in Dartmouth, Quebec City, Burlington (Ont.), and Sidney (B.C.).

The CHS is responsible for those waters extending to 200 miles off the coast, or to the edge of the continental margin, whichever is farthest, together with adjacent international waters of direct interest to Canada, and all navigable inland lakes and rivers.

The CHS effects hydrographic surveys and the principal end results for the users are nautical charts, sailing directions, tide tables, current atlases and Notices to Mariners.

Surveys are carried out from the regional offices. Field data are obtained, combined with information from many other sources, and drafted in the regions, where final reproduction negatives are prepared. Charts are printed in Ottawa, except for the Pacific Region, which prints charts locally, by contract.

The principal roles of headquarters are the establishment of national standards, quality control of all regional products, final approval and release of all CHS products, and finally, in-house training in field surveying and marine cartography.

National and international distribution of products is through appropriately located dealers who are supplied from centers at Ottawa or Sidney, B.C. There are 460 dealers in Canada and 40-50 in other countries.

EXPENDITURES ($000 and Person Years)

See Tables next two pages.

BENEFICIARIES

All users of Canada's navigable waters, including: shipping, fishing, recreational boating, etc. the CHS provides information and/or advice to the following federal government departments: Transport; Fisheries; Environment; Energy, Mines and Resources; and National Defence.

Hydrography Output Highlights (1985-86), as shown in the Estimates Document, Part III

a.	Navigational charts:	new:	25
		new editions:	94
		reprints:	120
b.	Geoscience maps:	natural resource maps:	5
		regional resource maps:	22
		marine science papers:	3
		maintenance of digital bathymetric data base:	7
c.	Sailing directions:	English edition:	6
		French edition:	7
d.	Notices to Mariners:		600
e.	Tides, currents, level measurements:	120 permanent gauges 25 temporary gauges	
f.	Field surveys:	annual program covers 20,000 km^2	
g.	R&D:	programs towards improving surveying and chart production	

	EXPENDITURES 81/82				EXPENDITURES 82/83				EXPENDITURES 83/84			
	OPERATIONS		ADMIN		OPERATIONS		ADMIN		OPERATIONS		ADMIN	
	$	PY	$	PY	$	PY	$	PY	$	PY	$	PY
PYs		290		301		293		317		307		320
Salaries					12,657		9,032		13,803		10,055	
Other O&M					5,295		8,820		7,986		8,480	
Capital					1,219		908		1,592		972	
Grants & Contributions					18		5		30		15	
Total	23,548	290	23,027	301	19,190	293	18,765	317	23,411	307	19,521	320
BLDGS.			800				40				475	
SHIP CAP			2,424				2,200				3,419	
TOTAL	23,548	290	26,251	301	19,190	293	21,365	317	23,411	307	23,415	320

	EXPENDITURES 84/85				ESTIMATES 85/86			
	OPERATIONS		ADMIN		OPERATIONS		ADMIN	
	$	PY	$	PY	$	PY	$	PY
PYs		358		324		364		339
Salaries	14,882		11,248		12,480		12,509	
Other O&M	11,485		9,271		8,894		8,196	
Capital	3,218		1,249		1,256		1,231	
Grants & Contributions	21		75		7			
Total	29,606	358	21,768	324	22,705	364	21,943	339
BLDGS.			3,000					
SHIP CAP			8,925				3,282	
TOTAL	29,606	358	33,693	324	22,705	364	25,225	339

OBSERVATIONS

The legal mandate of the CHS is directly related to safety and security of life and property in the marine environment.

An A Base Review on Hydrography was carried out in 1984. The findings are summarized below:

a. reinforcement of the mandate of the CHS;
b. confirmation that the CHS manages its resources effectively and efficiently;
c. the CHS compares well with that of most other developed countries;
d. the requirements for ship availability and person years for survey work are continual problems;
e. clients are well satisfied (special study carried out by a consultant);
f. the greatest problem, because of insufficient minor capital and ongoing A Base resources, is in the production of new charts;
g. quantifiable gaps in information exist regarding the Arctic and tidal current information.

The requirements of Arctic sovereignty and navigation, boundary disputes, extension of limits to 200 miles and beyond, have imposed new demands on the CHS.

The ratio of CHS work on 'new' charts to that of revising 'old' charts, is about 30/70.

The CHS does for navigable waters, what the Surveys and Mapping Branch of EMR, does for Canada's terrestrial real estate.

The CHS occasionally performs survey work for developing countries, through CIDA.

Public Works Canada carries out some hydrographic survey work in connection with its own projects, particularly in and around harbours. The Canadian Marine Transportation Administration of Transport Canada also carries out some hydrographic surveying of river channels, in the St. Lawrence and the Miramichi, for example.

A Memorandum of Understanding exists between the IWD and the CHS, concerning water measurements. Under this Memorandum, CHS has overall responsibility for tidal data in all areas of Canada; responsibilities for water level data in the Great Lakes are shared in a mutually and optimally acceptable manner.

The CHS recently purchased and installed four Kongsberg flatbed plotting tables, increasing productivity by automating the cartographic operations. Further productivity gains are expected shortly when a contouring package becomes fully operational, and when their digital data base is substantially increased.

Some of the new techniques which are in the proving stages promise to substantially decrease field survey costs.

The Ocean Mapping group, in CHS headquarters, has 10 person years allocated. It has completed the GEBCO (General Bathymetric Charts of the Oceans) for the International Hydrographic Organization, as a goodwill gesture. The group now intends to maintain the master compilation drawings of this series, on a routine basis.

The CHS through its Ocean Mapping group, has retained after separation from EMR, some capability in mapping the ocean bottom resources. It is now routinely producing maps of that nature.

The CHS headquarters Management and Planning group include staff and facilities for giving formal in-house courses in hydrography and cartography. Four person years are involved. This training is only given in the English language, at the present time, according to the CHS headquarters Work Plan (1985-86).

Contracting out experience in the CHS for field survey work has been quite favourable and costs are about the same as in-house, according to the CHS. On the other hand, the contracting out experience for cartography has not been as successful: the companies had a tendency to bid unrealistically low, and they still have a lot to learn.

Field survey work is partly seasonal, by nature, in our northern latitudes, since little work can be done during the winter months, except for work in the Arctic through the ice, in March and April.

The CHS has received considerable sums of supplementary funding ('soft money') over the past several years, in addition to A Base funding. This 'soft funding' has been running as much as $7,000,000 annually and has been used for R&D, most of which has been contracted out, and for contracting out field survey work and some cartography to private industry.

In the event that 'soft money' is cut back, management strategy would be to reduce the number of new charts produced per annum, and also reduce the amount of work contracted out.

From an organizational point of view, the present grouping of Ocean Science and Surveys, with Fisheries is only one of several possibilities. Like any organizational structure, it has some advantages and some disadvantages. Furthermore, there is an imminent move afoot to reorganize F&O internally, so as to group Fisheries Research (now with the Fisheries part of F&O) with Ocean Science and Surveys (the Ocean part of F&O).

ASSESSMENT

The legal mandate of CHS is considered to be very strong, and a model of simplicity and clarity.

The CHS is reputed to perform its hydrographic service work with high scientific and technical rigour.

The other two federal government departments (PWC and TC) who have given themselves a limited role in hydrographic survey work, have developed some expertise in doing so, and while it satisfies their respective requirements, it does not always satisfy CHS, because it lacks the professionalism of the latter. CHS is therefore occasionally reluctant to put its stamp of approval on the federal PWC and TC products, but it really has little choice but to approve them.

The co-operation of IWD and CHS in water level measurements for navigable waters, is working to the advantage of both parties and is to be encouraged.

The availability of considerable sums of 'soft money' is a good thing for the CHS, but it also makes the R&D work of CHS quite vulnerable to the availability, or not, of such supplementary funds. At existing A Base resource levels, the R&D program within CHS would be completely abolished and available resources almost all committed to maintenance surveying.

Since ship availability and person years are chronic problems for the CHS, it is considered that chartering ships and contracting out survey activity would make sense.

The proper use of Kongsberg flatbed plotting tables to automate the cartographic work ought eventually, to reduce the number of person years allocated to cartography in headquarters as well as in the three regions where these plotters are installed.

Since field survey work is essentially seasonal in nature, the involvement of industry in contracting out, would increase efficiency, particularly if the companies involved take advantage of the opportunity to obtain foreign work during the off-season.

Navigation charts are usually printed in Ottawa, except in the Pacific Region where they are printed locally, under contract, for their area of responsibility. This arrangement seems to work well and makes the charts available with less delay than those charts printed in Ottawa. Such "regional" initiatives ought to be encouraged, if cost-effective.

While the CHS maintains that costs for contracting out field survey work are about the same as if carried out in-house, the companies involved are quite convinced that their charges are considerably less than government costs, for the same work. In view of the fact that the "total" infrastructure costs of the federal government are never reflected completely in calculating actual costs, on the one hand, and in consideration of the fact that most costs in the private sector are usually lower, on the other hand, it is reasonable that their charges (including profit) would normally be equal to or less than government costs, for the same competency and output.

The wish of the Ocean Mapping group in CHS to maintain, on a permanent basis, the master compilation drawings of the GEBCO series for the IHO, is a commendable one, but is quite outside the true mandate of the CHS. Canada has done its share in that respect, and it should now be some other country's turn. Notwithstanding the above, CHS obviously now has to provide and maintain the data input for Canada's area of responsibility, in the international dimension. There should be a reduced requirement for human resources to look after that responsibility.

The work of the Ocean Mapping group in preparing natural resource maps of the ocean bottom is also considered to be outside the real mandate of CHS. The reason given by the CHS for being able to produce such output is because it already had the capital infrastructure to do it, through its principal mandate.

'Soft money' allocation which cannot be guaranteed, year in, year out, is not a healthy feature in the long term for any organization, especially for the CHS, which will only carry out R&D and do such contracting out, if it receives such funds.

The requirement for in-house formal training in hydrography and especially cartography is questioned. With the sophisticated and automated equipment now available within the CHS there should be reduced need for cartographic manual work, and therefore for cartographers. If, in spite of this, there are still departmental training requirements, then these should be available in the academic provincial sector. Another reason for devolving all formal in-house training (except on-the-job training, or OJT) is the fact that since this training really ought to be in both languages, there will probably have to be an increase in person year resources (at least one) to effect this.

Organizationally speaking, the link of CHS with Ocean Science, within OSS, is considered as being a viable one, and much more pertinent than the link of OSS with Fisheries. Through its ocean information Analysis and Transfer function, OSS has many "clients": Marine transportation, Energy, Defence, Environment, Fisheries, Coastal zone management, Development of ocean industry, the Scientific community and Recreation. Fisheries is thus only one of the clients of OSS, whether it be the Ocean Science part or the Hydrography one. It may well be that the most effective way to serve all these users with the minimum internal interference would be to place OSS with none of the various federal government departments directly involved. Both Ocean Science and CHS used to be with agencies other than Fisheries before, and somehow all three of them (OS, CHS and F) managed to survive. They are together now and they are also managing to survive. Whether or not they are again separated in the future, they will continue to survive. There is thus no single and simplistic solution to organization problems such as the one in question here. The link of OSS with Fisheries is considered as a "marriage" that has not worked out that well for OSS: the OSS priorities would not stand much of a chance if and when pitted against the priorities of a highly political activity like that in Fisheries; this not a condemnation, it is a statement of the reality of the situation as perceived by the team; there is also no special budget 'vote', within F&O for OSS, which would emphasize the "ocean" aspect of the department; in a nutshell, the management of F&O is really the management of the Fisheries part of the department, not of OSS. The true reasons that motivated placing OSS (and therefore, CHS) with the "senior" Fisheries component to form F&O in the first place, are no longer very pertinent. One thing is certain: that organizing a department based on the principle that the animal resource (the fish) has to be closely integrated with the environment (ocean) in which that resource lives, is not necessarily the most logical way to structure the relationships. Since there is currently a proposal to reorganize F&O internally in the near future, it would seem like an opportune time to rationalize the reporting relationship of OSS (and therefore of CHS) within the federal bureaucracy, by considering the various options possible, both within F&O and especially, outside.

OCEANOGRAPHIC DATA

Fisheries and Oceans

DESCRIPTION

The Department of Fisheries and Oceans is made up of six main organizational entities one of which is Ocean Science and Surveys. This actitivy is in turn made up of three work activities: Hydrography, Oceanography and Administration. Administration includes the capital costs of vessels and buildings but the operating costs are part of the Hydrography and Oceanography work activities.

Oceanographic work is centered in the Bedford Institute of Oceanography (BIO) located in Dartmouth, N.S., the Institute of Ocean Science (IOS) located in Sidney, B.C., and the Champlain Centre for Marine Science and Survey, located at Quebec City. These institutions are multi disciplinary, encompassing specialists in physics, chemistry, biology, geology and geography and they house fishery research and hydrography. The third institute, the Champlain Centre, is not as broadly multi disciplinary as the other two; it conducts research into a variety of biological, chemical and physical problems of the northern Gulf of St. Lawrence, the estuary, and in southern Hudson Bay. When the construction of the new Maurice Lamontagne Institute, of F&O, near Mont-Joli, Quebec, is finished, by 1986, the staff and facilities now at the Champlain Centre for Marine Science and Survey, in Quebec City, will be moved to that new location.

The Canadian Committee on Oceanography provides a co-ordinating and advisory function. The Interdepartmental Committee on Oceans is a recently formed committee designed to co-ordinate federal government activities in the oceans. The Fisheries and Oceans Research Advisory Council advises the Minister on all the research activities of F&O.

MANDATE

The foundations of Oceanography in Canada can be traced back to the BNA Act of 1867. In 1946, the Joint Committee on Oceanography was established and directed "to further oceanographic research in Canada, to define policy and to define and control through the Chief Oceanographer, the work of the Atlantic and Pacific Oceanographic Groups".

In 1979, the Department of Fisheries and Oceans Act gave the Minister responsibility for "the co-ordination of the policies and programs of the Government of Canada respecting oceans".

Canada is a member of the Intergovernmental Oceanographic Commission of UNESCO and carries certain responsibilities for international activities as a result of the Food and Agriculture Organization (FAO), and of the Scientific Committee for Oceanic Research (SCOR). Canada is also a member of the International Council for the Exploration of the Seas.

OBJECTIVES

The principal objectives of the Oceanographic activity of F&O have been formulated as follows:

- The conduct of a national program in oceanography and marine ecology for the definition and solution of existing and potential problems of a regional, national or international nature.
- The support of the management of marine and freshwater, renewable and non-renewable resources and the enhancement and protection of marine environmental quality.
- The co-ordination and implementation of policies and programs in ocean science with respect to the development and transfer of ocean technology; the extension of research activities to the university community; the acquisition and dissemination of ocean-related data and information, including the development of a national ocean information service; and the participation in international maritime activities of direct interest to Canada.

BENEFICIARIES

Companies carrying out environmental impact studies, researchers, regulatory agencies, fishery research, petroleum companies, geodesists, geophysicists, navigators, tidal power engineers, climatic research, government departments, etc.

EXPENDITURES

See charts next two pages.

OBSERVATIONS

There is one principal program carried out by Ocean Science, and that is the gathering and study of oceanographic data, mostly using ships, to better understand the properties of the water column; this program uses perhaps 90 per cent of the resources available. In addition, Ocean Science operates a wave measurement program for PWC, in cooperation with the offshore oil industry and COGLA.

The Marine Environmental Data Service (MEDS) maintains the main data bank at national headquarters in Ottawa. MEDS is that part of oceanography that archives, processes and distributes oceanographic data. MEDS depends on the whole of oceanography, as well as many other sources, to supply the data. In the regions, OSS institutes maintain additional data banks including data supplementary to those in MEDS. Examples of data collected by, and/or available, in Ocean Science, include:

1. Oceanographic Station Data including temperature, salinity, oxygen, sound velocity, nutrients and pH;
2. Tide and Water Level Data, operated by CHS;
3. Wave data measurements from over 130 locations around Canada;
4. Drifter data from drift cards, drifting buoys, bottom drifters, etc;
5. Current meter data from both industry and government sources; and
6. Other data sets obtained as a result of environmental studies in Arctic regions, observations made at drilling sites in the Labrador Sea, etc..

Ocean Science is concerned with the physical, chemical and biological processes of the whole water column. This includes the interaction with the atmosphere at the top end (air-sea interaction) and with the sediment, at the bottom end. Consequently, oceanographers in OSS may have close working relationships with atmospheric scientists (EC/A.E.S.), fisheries scientists (F&O/Fisheries Management), and/or

	EXPENDITURES 81/82				EXPENDITURES 82/83				EXPENDITURES 83/84			
	OPERATIONS		ADMIN		OPERATIONS		ADMIN		OPERATIONS		ADMIN	
	$	PY	$	PY	$	PY	$	PY	$	PY	$	PY
PYs		251				288		305		294		307
Salaries					14,567		11,718		16,193		12,615	
Other O&M					8,031		7,231		9,779		5,442	
Capital					3,093		1,131		2,894		1,610	
Grants & Contributions					375		15		375		15	
Total	20,897	251	16,111	263	26,066	288	20,096	305	29,241	294	19,682	307
BLDGS.							53		3,696		520	
SHIP CAP			874				2,059				2,476	
TOTAL	20,897	251	16,985	263	26,066	288	22,208	305	32,937	294	22,678	307

	EXPENDITURES 84/85				**ESTIMATES** 85/86			
	OPERATIONS		**ADMIN**		**OPERATIONS**		**ADMIN**	
	$	PY	$	PY	$	PY	$	PY
PYs		342		310		356		331
Salaries	16,937		12,696		15,108		16,456	
Other O&M	11,282		10,485		11,611		10,782	
Capital	3,765		1,384		2,624		1,619	
Grants & Contributions	267				375		8	
Total	32,351	342	24,564	310	29,718	356	28,865	331
BLDGS.			3,696					
SHIP CAP			9,120				4,923	
TOTAL	32,351	342	37,380	310	29,718	356	33,788	331

marine geoscientists (EMR). Scientists from each of these organizations are co-located with oceanographers at BIO or IOS.

The Bedford Institute of Oceanography operates three research vessels and several smaller craft. The Institute of Ocean Science on the west coast, operates two research vessels (one of which is new) and several smaller craft including the submersible Pisces IV. The Champlain Centre operates one small vessel. There are provisions for sharing of ships with CHS and with various universities (such as Dalhousie, U.B.C., McGill, etc.) and other government departments (EMR, EC). This is a cost-effective method of utilizing such major capital investment.

The Ocean Science activity of OSS has, through its work, established the reputation of being "world class" and the two larger institutes, particularly BIO, are considered to be among the best in the world.

BIO and IOS collaborate on some projects, but find that many of the phenomena being studied and recorded are peculiar to their particular ocean. BIO therefore must maintain links with other Atlantic oceanographic institutes and IOS with Pacific institutes.

IOS is not staffed to take advantage of its full capability, particularly now that the new vessel is operational.

Ocean Science is involved in wave measurements with automatic recorders, and so is the private sector, under contract with OSS. AES is also involved in the wave program, through its wave forecasting activities (with DND). Furthermore, AES is the collection point through its communications circuits for a vast real-time collection of ship reports of wave heights and periods. Finally, AES is very much interested in the climatology of ocean waves.

From an organizational point of view, the present grouping of Ocean Science and Surveys, with Fisheries is only one of several possibilities. Like any organizational structure, it has some advantages and some disadvantages. Furthermore, there is an imminent move afoot to reorganize F&O internally, so as to group Fisheries Research (now with the Fisheries part of F&O) with Ocean Science and Surveys (the Oceans part of F&O).

ASSESSMENT

The real issues brought out in this report on Ocean Science are relatively few in number. This does not mean that almost everything is "smooth sailing" in that organization. We really do not know. In a very scientific agency, with little, if any, operational role or operational surveys, it is difficult indeed to arrive at an in-depth analysis of the way activities are carried out, or especially of the pertinency of those activities. The best that can be done in a quick survey (a handful of interviews, a cursory reading of material, and internal Major Surveys Team discussions) is a superficial coverage and a hope that the issues will be of the sore-thumb character and therefore that they will easily stick out. To claim otherwise would be very presumptuous on our part.

There are several actors in sea state activities and their respective roles are not clear enough, nor are they understood by all concerned. Eliminating this relative confusion would surely enhance the effectiveness and efficiency of wave activities.

Problems of environmental quality are dealt with adequately concerning air, land and fresh water, in Canada, mostly in Environment Canada; indeed, there is an air quality program, a land quality program and a water (fresh) quality program. However, the equivalent does not exist for the ocean: there does not appear to be an equivalent marine environmental quality program, even though there are activities in the regions that are being carried out that relate to the subject.

The vocation of the Maurice Lamontagne Institute is planned to include research work in fisheries and in oceanography, creating another research and operational establishment, on the model of BIO and IOS, but on a smaller scale. It is considered, by most of the Ocean Science senior management that it would be an unjustified duplication to do so. What is required instead, since the decision has been made that there is to be an establishment of that nature in the St. Lawrence estuary, would be to limit its mandate and specialize its research activities into estuary marine problems.

Organizationally speaking, the link of Ocean Science with CHS, within OSS, is considered as being a viable one, and much more pertinent than the link of OSS with Fisheries. Through its ocean information Analysis and Transfer function, OSS has many "clients": Marine transportation, Energy, Defence, Environment, Fisheries, Coastal zone management, Development of ocean industry, the Scientific community and Recreation. Fisheries is thus only one of the clients of OSS, whether it be the Ocean Science part or the Hydrography one. It may well be that the most effective way to serve all these users with the minimum internal interference would be to place OSS with none of the various federal government departments directly involved. Both Ocean Science and CHS used to be with agencies other than Fisheries before, and somehow all three of them (OS, CHS and F) managed to survive. They are together now and they are also managing to survive. Whether or not they are again separated in the future, they will continue to survive. There is thus no single and simplistic solution to organization problems such as the one in question here. The link of OSS with Fisheries is considered as a "marriage" that has not worked out that well for OSS: the OSS priorities would not stand much of a chance if and when pitted against the priorities of a highly political activity like that in Fisheries; this not a condemnation, it is a statement of the reality of the situation, as perceived by the team; there is also no special budget "vote", within F&O for OSS, which would emphasize the "ocean" aspect of the department; in a nutshell, the management of F&O is mainly the management of the Fisheries part of the department, not of OSS. The true reasons that motivated placing OSS (and therefore, Ocean Science) with the "senior" Fisheries component to form F&O in the first place, are no longer very pertinent. One thing is certain: that organizing a department based on the principle that the animal resource (the fish) has to be closely integrated with the environment (ocean) in which that resource lives, is not necessarily the most logical way to structure the relationships. Since there is currently a proposal to reorganize F&O internally in the near future, it would seem like an opportune time to rationalize the reporting relationship of OSS (and therefore of OS) within the federal bureaucracy, by considering the various options possible, both within F&O and especially, outside.

STATISTICS AND ANALYSIS UNIT

Fisheries and Oceans

DESCRIPTION

The Fishery activities of the Department of Fisheries and Oceans operate from a national headquarters in Ottawa with regions set up in Newfoundland (St. John's), Scotia-Fundy (Halifax), Gulf (Moncton), Quebec (Quebec City) Ontario (Burlington), Western (Winnipeg), and Pacific (Vancouver). Canada is the world's largest exporter of fish. The industry employs about 100,000 fishermen and plant workers. The annual value of the fish catch as landed is close to $1 billion ($874 million in 1983). The fish are processed in 990 plants and the value of processed fish and derived products is in excess of $2 billion. The Fisheries Service manages or oversees every aspect of the industry and in so doing expends about $500 million annually.

The Statistics and Analysis Unit of the Economic Analysis Division is comparatively small but the catch statistics which they gather and compile are important to the enforcement of fish catch quotas which in turn are a basic control on fish stocks. The catch statistics also provide an important input to Fisheries Research which is charged with the responsibility of evaluating all of the factors which have a bearing on the size and well-being of fish stocks, estimating present and future abundance and yield, and preparing management plans for each stock.

AUTHORITY

The authority under which the Statistics and Analysis Unit is empowered to act is set out in the Fisheries Act which states that (Section 48) "Owners and managers of fisheries or canning establishments or fresh fish businesses, and the captains or owners of every fishing vessel must, on the request of the minister or fishery officer, file detailed returns on fish caught, bought, packed, and canned as well as fishery employees, fishing vessels", etc.

USERS

The first users of the Statistics and Analysis Unit data are the officers of the Surveillance and Enforcement

Unit of F&O who rely on timely catch statistics to know when quotas are reached and fishery closure is warranted.

Other major users in F&O are research and resources management and economic staff. Provincial governments, industry groups, academics, private researchers, unions, the general public, and international agencies all make use of these statistics.

EXPENDITURES

The number of person years and the budgeted or actual expenditures of the Statistics and Analysis Group for the years 1983/84 and 1984/85 are set out on the following page.

The effort seems to be somewhat greater than the number of person years would indicate since it appears to be common practice to take advantage of the presence of Community Service Officers, Fishery Officers, etc. to aid in the collection.

OBSERVATIONS

Fishery statistics report the current and seasonal catch by zone and vessel of each of the three general categories of fish, i.e. ground fish, pelagic fish, and shell fish and of a number of species within these groups.

The basic statistics are taken from the purchase slip which records the transaction between the fisherman and the buyer. It is the obligation of the buyer to make out this form. It is supplemented by logs collected from the fishing vessels.

Another important and timely source of information is a ship's hail which is a daily message from each of the offshore vessels transmitted to the shore captains and on to regional headquarters. This message conveys catch information, location, etc. It is checked against logs, etc. and reconciled before it is used.

The purchase slip and ship's log information is further supplemented by personal observations of statistics control officers and fishery officers who have the opportunity to spot-check the catch as it is landed. These personal observations do not alter the statistics but are a factor in quota management.

DEPARTMENT OF FISHERIES AND OCEANS
RESOURCE ALLOCATIONS IN STATISTICS AND SURVEYS

	83/84			84/85		
	PYs	SAL ($000s)	O&M ($000s)	PYs	SAL ($000s)	O&M ($000s)
NRC(1)	9	290	98	9	295	100
Newfoundland(2)	21	537	493	25	1,026	553
Scotia Fundy (3)	17	487	130	15	496	84
Gulf	10(4)	196(5)	471(4)	14(4)	547(4)	844(4)
Quebec(5)	6	176	117	6	225	126
Western(5)	1	40	38	1	40	38
Pacific(5)	10	220	242	11	313	342
	74	1,946	1,589	81	2,943	2087

1. Includes surveys
2. Includes field statistics staff and EDP
3. Includes field statistics staff
4. Includes field statistics staff and EDP
5. Includes RHQ statistics only

Sources: 83/84 A-Base Review
84/85 Program Inventory

Note: 82/83 figures are not readily available. Resources expenditures were not expected to be greater than 83/84 level because both Gulf and Quebec regions were not fully staffed in their operations. Contributions from field Inspection and C&P officers were not included.

The purchase slips, logs, observations, etc. are collected on a weekly basis and mailed to the regional headquarters. There they are coded, entered into computer files and, subsequently, total catch information is printed out under a large number of classifications. This information is provided as promptly as possible to the Surveillance and Enforcement Unit.

The catch statistics including the catch rates are also provided on a timely basis to Fishery Research where they constitute one of the major factors to be taken into consideration when estimating the size of current fish stocks as well as future abundance and yield.

The quotas for each region are arrived at by a Resource Allocation Division working with Fishery Research. The recommendations from the region are then submitted to national headquarters for final revision.

The quotas are highly-detailed in that they make provision for:

1. division of the catch between provinces;
2. division between inshore and offshore fisheries;
3. individual stocks of fish, for example there are 32 stocks of groundfish and over 80 stocks overall;
4. some vessels have specific quotas;
5. quotas are established for each zone; and
6. in some cases quotas are given to individual groups of fishermen.

Some species such as lobster are not controlled by quota but by effort. The fisherman is permitted a limited number of pots but is free to catch as much as he can during the season.

The Pacific Region regulated fishing on an effort basis until 1982 when they changed to a quota system.

For some species such as herring roe, extraordinary measures must be taken to limit fishing in order to ensure future well-being of the stock.

Owing to the narrow continental shelf and the nature of the fishery, the Pacific Region does not have a significant offshore fleet, i.e. vessels larger than 100 feet in length.

The Pacific Region Statistics and Analysis units operate in a generally similar manner to the Atlantic Regions with the purchase slip constituting the basic source of information. They also contend with an element of poaching in which case there is no slip to collect.

The Statistics and Analysis unit in each region normally includes a manager, and a head of data collection. Other personnel in the regional headquarters are engaged in administration and in data processing. Field personnel are collectors and coordinators.

The ratio of inshore to offshore fisheries varies widely;

e.g. Scotia-Fundy is 14% inshore and 86% offshore
Newfoundland is 25% " and 75% "

The Scotia-Fundy inshore fishery would in this case only include boats smaller than 25.5 tons. The Newfoundland inshore fishery would be the small boat fishery including boats up to 35 feet in length. The Newfoundland percentages are approximate.

These percentages are by weight. On a value basis the inshore percentages would increase because of the high value lobster fishery.

The Scotia-Fundy region employs seven statistics control officers in the field, including area coordinators, to collect the slips, logs, etc. Their efforts are supplemented by a number of community relations officers and by 30 contract personnel who collect slips and forward them on a part-time piecework basis.

The Newfoundland region relies more heavily on contract personnel, employing 200 on a similar piecework basis. They have a 25 person year group including 6 field officers. They process about 400,000 purchase slips per year.

Each region maintains its own data base on fishery statistics. The use of the large group of contract collectors in Newfoundland has resulted in a speed up of statistics collection and reporting in that region by about 15 days.

The four Altantic regions account for 85 per cent of all fish caught in Canada by weight and 66 per cent by value.

ASSESSMENT

The reliability of the purchase slips from which the basic information is gathered varies widely. The larger offshore vessels provide accurate and timely information. The inshore fishery purchase slips are much less reliable both as to accuracy of reporting and of dating. The reasons for the inaccuracies may be due to:

1. Unemployment insurance; the slips are dated with a view to maximizing eligibility for unemployment insurance.
2. Income tax; the fishermen fear that the slips will be used to establish income.
3. Antisocial behaviour aggravated by the recent industry reorganization of the Atlantic fishery which is perceived to have helped the big operators but did nothing for the little guy.

The gathering of the statistics should be a routine matter but due to the reasons listed above, it is in fact quite difficult for inshore fisheries. In the case of the lobster fishery, in particular, the purchase slips are received in anything but a regular, orderly manner making it very difficult to establish accurate total catch figures.

OTHER RELATED PROGRAMS

PUBLISHING, PRINTING, AND ADVERTISING MANAGEMENT

Supply and Services

PREFACE

Major surveys of the Government of Canada are disseminated in print, map, and machine-readable form and are occasionally displayed in exhibitions. This assessment of the Department of Supply and Services programs is focused on their support role for dissemination of printed materials and exhibition displays, and is not an assessment of the department's procurement and general operations practices.

OBJECTIVES

These three organizations (publishing, printing, and advertising management) are responsible for supervising, coordinating, and often delivering Government of Canada publishing, printing, and advertising services. Additionally, the Canadian Government Publishing Centre acts as a liaison with publishers in the private sector, and markets in Canada and abroad priced publications generated by federal departments and agencies.

AUTHORITY

The principal authority for publishing is specified in Chapter 335 (Publishing) of the Administrative Policy Manual of the Treasury Board of Canada approved under Section 5(1) of the Financial Administration Act, with provisions also pursuant to the Department of Supply and Services Act and the Official Languages Act.

PROGRAM DESCRIPTION

As a policy, the Government of Canada attempts, where feasible, to publish government information (books, periodicals, booklets, looseleaf materials, microfilms, microfiches and accompanying film strips, audio tapes and records) in co-operation with Canadian publishers in the private sector. Where this is not feasible, any department which proceeds to publish a work itself shall accept full publishing responsibility, but in this case the printing and production of the work shall be requisitioned through the Department of Supply and Services. The Canadian Government

Publishing Centre implements the policy on publishing, including the development of technical, procedural and operational means. In addition, the Publishing Centre markets and sells all priced government publications and arranges for the free distribution of publications as required by statute or executive order.

Government publications are divided into four categories, with the Publishing Centre responsible for establishing list prices for Category A and B publications and to recommend to the author department the amount of subsidies where these are required. The Categories are:

A. **Full Priced General Publications** - those aimed at a wide segment of the population and marketable at a list price which enables the Publishing Centre or the co-publisher to recover the full cost of publication; this constitutes less than one per cent of all titles carried by the Publishing Centre based on net revenue; it should be noted that Statistics Canada, the House of Commons, and the National Museum also sell priced publications;

B. **Supported Price General Publications** - those co-published publications subsidized by the author department where the item is deemed by the Publishing Centre to be "of such a high standard of literacy, economic, social or cultural merit that their prime value is in terms of enhanced prestige for Canada at home or abroad; this constitutes about one per cent of all titles;

C. **Priced Departmental Publications** - those not assigned to Categories A or B but where the list price is set by the publishing department in consultation with the Publishing Centre and are sold through arrangements made by the Publishing Centre; about 99 per cent of all titles are in this category; and

D. **Free Departmental Publications** - remain entirely the responsibility of the author department, but departments are encouraged to consult with the Publishing Centre to "maintain a high degree of consistency throughout publications of the government; the Centre distributes these to full and selective depositories. The share of titles so published is unknown to us.

As a rule, author departments bear the costs of developing documents through to the end of the manuscript stage. SSC charges costs for publishing and printing separately. Prices are established on a "rule", which currently is six times the variable cost (i.e., the cost to physically put together the publication). All revenues accrue to a Department of Supply and Services Supply Revolving Fund, which covers the full costs of operating the department's publishing and printing services, plus a portion of departmental overhead. Direct costs to be covered include the maintenance of a large inventory of publications and costs of surplus, unsold stocks, which are managed through a Board of Condemnation. An independent audit of the Fund is made.

Printing is accomplished through a Main Plant and a network of 48 plants in the National Capital Region, and 50 others located throughout Canada or through contracting out to the private sector. The department estimates that about 80 per cent of printing is supplied privately, with the "Make" portion limited mainly to secure documents and those requiring timely distribution. It is the policy of the department to reduce the portion that is printed internally. It may also be noted that the Grace Commission in the United States recommended operation of a Main Plant, and centralization of inventory control as key elements needed there to generate publishing savings.

Advertising procurement is accomplished through the Advertising Management Services Branch which is responsible for contracting for advertising services, maintaining under contract, a private sector organization to act as the Agency of Record. All major decisions on advertising are made by the Advertising Management Group and the Advertising Review Committee (of Cabinet).

Table 1 provides indications of resources and revenues for each of the three groups for Fiscal 1984-85.

Table 1
Financial Indicators, Selected Years ($000s)

	81/82			84/85		
	Publish	Print	Advert	Publish	Print	Advert
Salaries and Wages	3,560	25,758	343	3,920	30,549	464
Other O&M	1,521	14,999	2,437	1,814	10,272	76
Capital	170	1,482	0	22	1,151	0
TOTAL	5,251	42,239	2,780	5,756	41,972	540
Revenues	7,261	57,830	31,167	12,166	66,478	66,679
Person Years	105	1,044	17	131	964	14

ASSESSMENT

From an efficiency standpoint, there would appear to be few gains that could be achieved in publishing and printing, since most work is directed to a highly-competitive private sector, which provides a benchmark against which to compare internal costs of operations. Operation of a large organization and an incentive to justify previous capital expenditures may inhibit the speedy adoption of new technology that yields lower-cost printing, but the evidence to support such an allegation is weak; the department insists that it is on the "cutting edge" of technology.

In practice, most of the surveys outside of Statistics Canada, which issues all categories of publications, appear to issue Category C and D publications. In general, such publications are highly technical and directed to small, targeted groups of specialist users. In these instances, interests of the client groups are highly specialized and the insistence on "uniformity" of presentation and other publishing standards appears to be exercised with a light hand. While this tends to promote development of "publishing" capabilities in the author departments, the requirement to specialize the quality of service seems an appropriate basis for current arrangements. This does shift some of the publishing costs back to the departments, which often also manage the distribution of their documents (including maintenance of client lists). This, and the fact that most of these documents are free or are "subsidized" does raise the question of whether these publications are equivalently priced.

Although departments are responsible for content and format, there are, surprisingly, indications that DSS intervention in publishing sometimes leads to higher costs (more "glossy") publications than the author departments sometimes feel are warranted. The evidence of this is spotty, however.

There are irritants between the client departments and SSC, but there is a strong consensus that working relations are satisfactory. In general, client departments wish to promote their publications by holding down the price of their publications, while the pricing practices of SSC generally generate a higher price. As well, author departments often feel that they are not sufficiently credited with generating the revenues that accrue to the Revolving Fund, and some express the view that the Fund is "too rich" (implying that prices could be lowered). But an independent audit of the Fund would seem to be a sufficient process protection.

Departments are required to undertake their exhibition work through the Exhibition Centre. There are believable indications provided by client departments in this area that the costs are higher than would be charged by private sources acquired directly by the author departments. A review of this toward the purpose of relaxing insistence on procurement by SSC seems warranted.

Statistics Canada is effectively exempted from Chapter 335's provision that SSC manage publishing, and operates its own publishing function. While both SSC and Statistics Canada price on "full costs" of publishing, in practice Statistics Canada appears to load more "publishing" costs into their price determination than SSC. This means that the definition of the "public good" differs for users of Statistics Canada publications from those of all other Departments, many of whom also subsidize their publications. Price determination should be standardized; either SSC should be allowed to load in more costs or those of Statistics Canada should be rolled back. There are strong incentives to adopt the former approach since government seems to want to generate revenues, but the price to society of this is a diminution of the public good. This is a questionable practice in a democratic society and will certainly reduce the quality of science insofar as it will limit the review by private resources of work accomplished within or for government. Further, it weakens the competitive position of Canadian industry so that gains to the federal treasury would likely be more than offset by loss of incomes to Canadian businesses and households.

Maps are exempted from SSC coordination, which is deferred in Chapter 335 to Energy, Mines and Resources and the Department of National Defence. In practice, the surveys use Energy Mines and Resources, and the geo-cartographic capability established at Statistics Canada. A review of this towards the end of ensuring standards and reduced duplication seems warranted.

OTHER RELATED PROGRAMS

Auditor General

OBJECTIVE

To provide appropriate audit information for use by the House of Commons in its scrutiny of government programs, revenues and expenditures.

AUTHORITY

Auditor General Act, 1977. Further responsibilities are also assigned by Part XII of the new Financial Administration Act.

DESCRIPTION

The Office of the Auditor General is part of the legislative branch of government, and thus operates independently of the government of the day. The products of the Office are developed for direct use by the House of Commons in its scrutiny of government programs and financial activities. The Office is directly accountable to the House of Commons, through the Public Accounts Committee, for providing audit information that is significant, timely and produced in a cost-effective manner.

The responsibilities of the Office have changed significantly during the past decade - most notably with the enactment in 1977 of the present Auditor General Act. This introduced the requirement to report to Parliament on "value for money" considerations, as well as the traditional aspects of verification of summary financial statements and compliance with legislative authority. Again, beginning in 1984-85, as a consequence of amendments to the Financial Administration Act, new and extended responsibilities relating to the control and accountability of Crown corporations devolve upon the Auditor General.

In program-activity terms, the work of the Office of the Auditor General currently comprises a single activity: "Legislative Auditing", which is subdivided into the substantive subactivity of "Audits", and two supporting subactivities, namely "Professional and Methodology Development", and "Management Support". The first of this latter pair is intended to ensure the quality and consistency of audit work through staff training and various research and developmental activities, while the second covers support services including program evaluation and internal audit.

For the year 1983-84 and earlier, the budgetary and person-year data for the Office of the Auditor General are displayed below in terms of the former reporting structure which covered "Government Audits", "Other Audits" and "Administration".

Expenditures: (Budgetary Expenditures and Authorized PYs)

	Govt. Audits	**Other Audits**	**Admin.**	**Total**
74/75	6,546	134	944	7,624
	(343)	(6)	(18)	(367)
75/76	8,151	210	1,051	9,412
	(365)	(5)	(30)	(400)
76/77	12,311	381	1,315	14,007
	(379)	(6)	(43)	(428)
77/78	17,595	576	2,549	20,720
	(385)	(9)	(94)	(488)
78/79	20,435	489	2,838	23,762
	(396)	(10)	(105)	(506)
79/80	20,881	546	3,828	25,255
	(432)	(12)	(116)	(560)
80/81	22,019	205	4,411	26,635
	(407)	(4)	(140)	(551)
81/82	26,072	102	5,707	31,881
	(408)	(3)	(140)	(551)
82/83	28,178	152	5,768	34,098
	(408)	(3)	(140)	(551)
83/84	31,062	229	6,221	37,512
	(445)	(3)	(140)	(588)

	Audits	**Program & Meth. Dev.**	**Mgmt. Support**	**Legisl. Auditing**
84/85	29,235	3,250	8,119	40,604
				(640)
85/86	31,775	3,928	7,265	42,968
				(659)

OBSERVATIONS

The management of the Office of the Auditor General advised that, after reading the terms of reference of the

Major Surveys Team (which had not been supplied to them at the outset, so that they had not had the opportunity to convey their views earlier), they did not consider the Nielsen Task Force as having any jurisdiction over their work and that, consequently, they were under no obligation to cooperate with the Major Surveys Team. The information supplied by them in response to questions from the team (which they answered quite willingly) was to be understood as without prejudice to this perceived exemption.

The programs under scrutiny by the Major Surveys Team have, as a central purpose, the provision of information to the people of Canada about themselves, the environment they live in, and their economic and social activities. The work of the Auditor General's Office is wholly consistent with this view. The House of Commons represents the people of Canada and the Auditor General is a servant of the House. In providing the House of Commons with assessments of the effectiveness and efficiency of programs conducted by the executive area of government, he or she is therefore indirectly providing an information service to the people of Canada.

The necessity for the kinds of function performed by the Office of the Auditor General - including the more recent ones relating to "value for money" considerations - are taken for granted here. While there may be legitimate concerns among departments as to whether the Office has yet hit upon the most appropriate techniques for judging whether programs do indeed yield "value for money", it is not disputed that the mere monitoring of compliance with conventional accounting proprieties is no longer a sufficient safeguard of good stewardship on the part of program managers.

The crucial question is not, therefore, whether there should or should not be auditing, but rather "how much is enough". It may be recognized at the outset that there can be no unique or simple answer to this question. Nevertheless, the public deserves to have more assurances than are readily available to it at the present time that mechanisms exist to address the issue of the appropriate level of audit services.

As noted earlier, the Auditor General acknowledges (see p. 7 of the 1985-86, Part III Estimates) an obligation to provide to the House of Commons "audit information that is significant, timely and produced in a cost-effective manner". At the same time, the Auditor General Act gives him or her considerable discretion in determining what needs to be done in meeting this requirement (".... shall make such examinations and inquiries as he considers necessary to enable him to report as required by this Act"). Similarly, the Auditor General may make a special report to the House of Commons in the event that the estimates provided for his or her Office are considered inadequate for the fulfillment of the Office's responsibilities.

Superficial examination of published information on budgeting expenditures and person years is not directly helpful on the question of what level of resources is optimal. For example, authorized person years in the purely auditing functions went from 349 in 1974/75 to 461 in 1985/86. This increase may not be at all unreasonable in relation to the extension of the Office's mandate commented on earlier. It may in fact be overstated since, in more recent years, there has been less reliance on the use of short-term professional contracts for acquiring specialist skills. On the other hand, the person-years allocated to "Administration" (later called "Management Support"), increased from 18 person years to 139 between 1974-75 and 1985-86, and there is no obvious explanation for this.

The Office of the Auditor General calculates a measure of "cost per $1,000 audited", the numerator of which is the Office's own budgetary expenditures and the denominator of which is provided by the total expenditures, revenues, assets and liabilities of the federal government. This ratio appears to have trended down slightly since 1979-80. The validity of such a measure is probably dependent upon stability through time in the complexity and magnitude of the mix of transactions and other quantities which add up to the denominator. For example, ten transactions adding to a given amount presumably take more time to audit than a single transaction of the same amount, while a sharp decrement from one year to the next does not seem likely, on the face of it, to result in a corresponding decrement in the requirement for audit attention.

Comparisons with the relative expenditures of Auditor-General-type functions in other countries have a superficial appeal as indications of where Canada stands in the international pecking order as regards the rigour of its auditing work. But quite apart from the difficulty of assembling useful figures, differences in the nature and scope of the respective mandates are likely to render such comparisons suspect.

If the analysis of numbers fails to provide clues on "how much auditing is enough", the Minutes of Proceedings and Evidence of the Standing Committee on Public Accounts, on the other hand, provide continuous evidence of the generally high degree of satisfaction on the part of the Committee with the work of the Office of the Auditor General. But laudatory comments on individual audits, or on cross-cutting analyses which form major themes of particular reports by the Auditor General, are not the same thing as an evaluation of the totality of work taken on by his or her office. Indeed, a judgement that any single area of the Auditor General's work is being well done could be quite consistent with a view that, in the aggregate, too much was being done - or being too well done.

The Auditor General Act stipulates in Section 22(1) that a qualified auditor nominated by the Treasury Board shall examine the receipts and disbursement of the Office of the Auditor General and shall report annually the outcome of his examinations to the House of Commons. As might be expected, these responsibilities are interpreted quite literally by the designated auditor, whose reports therefore do not contain any qualitative judgements.

The organizational structure of the Office of the Auditor General now has a Program Evaluation and Internal Audit group, reporting directly to the Auditor General, with the following objectives:

- assessing the effectiveness with which the Office's audit activities support the scrutiny role of the House of Commons;
- assessing whether the quality of the Office's audit work is such that they select matters of most significance for review, and that they review these in a professional and cost-effective manner;
- assessing whether important management practices and procedures throughout the Office reflect due regard for value for money.

The second of these objectives is particularly relevant to the question which is the subject of these observations, namely "how much auditing is enough?" It is therefore encouraging that the Auditor General intends to inform the

House of Commons, probably through his Annual Report, of major findings in these three areas.

ASSESSMENT

The function of the Auditor General is of vital importance in a democratic society and, consistent with the philosophy previously outlined, is one which the people of Canada need to understand better.

All indications are that the Office of the Auditor General of Canada operates with a high degree of professionalism, and that its reports on particular programs, functions, etc. meet a real need. To assist the Auditor General in operating with the required degree of impartiality and objectivity, the Auditor General Act provides privileges not generally enjoyed by public servants working for the executive arm, including status as a separate employer under the Public Service Staff Relations Act, and the right to formally challenge the Office's budgetary allocation.

Emphasis on professionalism and objectivity is absolutely necessary for the Auditor General to make the appropriate impact upon client departments, but it also tends to give the Auditor General the last word on what resources are needed to carry out his functions, and thus, obscures the requirement for a mechanism that would provide a lay judgement as to how much auditing is needed or wanted. There is, therefore, an anomaly here similar to what would exist if the medical profession not only governed the treatment of individual patients, but also determined how much the community as a whole should spend on medical care.

The need for some countervailing pressure - and it need not be very heavy-handed - to the perceived right of the Auditor General to "write his own ticket" can be argued irrespective of economic circumstances, but it is particularly evident under the economic and budgetary circumstances which have prevailed during the past few years. Many programs and services of the federal government have been critically evaluated, reoriented and frequently downsized. There is little evidence of the Auditor General's Office having been exposed to these chilly winds: the impression prevails among many of their clients that, while they are now compelled to travel "economy", the Auditor General still sits in "first-class".

The Office of the Auditor General appears to be not insensitive to considerations of this kind, as is shown by its commitment to undertake program evaluation work, and to make the findings publicly available through the Auditor General's report.

RECORD OF CONSULTATIONS

G.M. MacNabb	President, Natural Sciences and Engineering Research Council of Canada
A.E. Collin	Secretary, Ministry of State for Science and Technology
L. Kerwin	President, National Research Council
S. Smith	President, Science Council of Canada
E. Gallant	Chairman, Public Service Commission of Canada
S. Rosell	Executive Director, Organization and Systems, PCO
J.W. Grace	Privacy Commissioner
I. Hansen, QC	Information Commissioner
K.T. Hepburn	ADM, Technology and Industry Department of Communications (DOC)
B.C. Blevis	ADM, Research, DOC
H. Swain	Assistant Secretary to the Cabinet
K. Newton	Economic Council of Canada
J. McQueen	Deputy Minister of Labour
L. Cooke	Assistant Deputy Minister, Natural Resources (Alberta)
H. Ford	Director, Alberta Bureau of Statistics
K. Meisner	Past Chairman, Treasury Board Review Committee on Land Related Information Systems, Alberta
M. Wilk	Chief Statistician of Canada
M. Catley-Carlson	President, CIDA
F.E. Whitehead, R. Barnes	Office of
D.L. Pearce, R. Pease	Population, Census and Surveys, London, U.K. (re impact of Rayner Review)
B. Jordon	Overseas Development Administration, London, U.K.
Sir J. Boreham	Chief Statistician for Britain (re impact of Rayner Review)

N. Gendron	Chief Statistician of Quebec
M. Paradis	Associate Deputy Minister, Lands and Forests (Lands) Quebec
G. Layton	Team Leader, Environment Self-Assessment Team
J. Bruk	Team Leader, Natural Resources Team
J. Gérin	DM, Environment
A. Banerd	Advisor to DM, Revenue Canada
P. Anglin	ADM Legislation, Revenue Canada (Taxation)

Yvon Goulet DG, Management Practices	STC
François Bastien Dir., Program Eval. Internal Audit	LC
Mike Valiquette Dir., Labour Data	LC
Dr. David Beavis DG, Information Systems	NHW
Dr. Keith Newton Project Director, Technological Change and Labour Markets	Econ. Council
Jennifer McQueen, DM	LC
Bob Gordon DG, Central Analytical Services	LC
Adair Banerd Special Adviser to DM	RCT
Les Smith Dir. Information Services	RCT
Jacob Ryten DG, Classification Systems	STC
Gerry Page A/DG, Regional Operations	STC
Michel Rochon DG, Marketing and Info Services	STC
John Coombs DG, Institutional and Social Statistics	STC
Yvon Fortin Assistant Chief Statistician Communications and Operation	STC
Gordon Brackstone DG, Methodology	STC
Edward Outrata DG, Informatics	STC
Bruce Petrie Assistant Chief Statistician	STC
Ivan Fellegi Deputy Chief Statistican	STC
Bernie Abela Dir., Statistical Services	RCT
Kevin Lynch	FIN

Stu Wells Assistant Chief Statistician	STC
Brian Malloy and Ray James	TB
Tom McCormack Chief Economist, Data Resources Inc.	Data Resources
Bill Empey Vice Pres., Data Resources Inc.	(Toronto)
Faris Shammas	"
Ian McKinnon	DECIMA (Toronto)
Loren Simerl	Metro Toronto Soc. Science Planning Council
Loren Kenney Dir., IRIS (Fed. Relation Information Service)	LC
Bill Klein A/D, Labour Data	LC
Dr. Monique Jérome Forget ADM, Policy Planning & Information	NHW
L.W. Rehmer Dir., Health Information	NHW
J.A. Schriel Dir., Provincial Systems and Analytical Services	NWH
Ernie Boyko Dir., Corporate Planning Analysis	STC
H.M. Holtz A/Chief, Financial Planning and Analysis	NWH
Bernie Lynch DG, Operations	STC
Bob Baldwin (CLC)	CLC

Steven Turner
Dir., Communications Planning Services
SSC

Neil Campbell
DG, Marine Science and
Information Directorate
Oceanographic Data

Tim Davis
Dir., Communications Division
Statistics Canada

Jacques Gagnon
Dir., Publications Division
Statistics Canada

Bill Traversey
Dir., Water Quality Branch

Bob Gordon
DG, Central Analytical Services,
Labour Canada

Bob Keen
Dir., FORSTATS
National Forestry

Jean Tie
Dir., Land Resources and Data Systems Branch
EMR

John MacArthur
Dir., Reproduction and Distribution Division
EMR

Neil Anderson
Dir., Planning and Development
Canada Hydrographic Service

E.A. Godby
DG, Canada Centre for
Remote Sensing

Dr. R.G. Blackadar
Dir., Geological Information Division
EMR

Pete Clarke
Dir., Land Resource
Research Institute
Agriculture Canada

John Camp
Deputy Director,
Editorial and Publishing
Oceanographic Data

Doug Russell
Head, Environmental and Economic
Weather Service

W.W. Hutchison, Assistant Deputy Minister, Earth Science, EMR

J.E. Harrison, Senior Scientific Advisor, Earth Science

Dr. R.A. Price, Director General

James Harrison, Consultant, former Assistant Deputy Minister, EMR (ex-Director General of GSC, ex-v.p. of UNESCO)

Dr. J.G. Fyles, Chief Geologist, GSC

Dr. A.G. Darnley, Director, Resource Geophysics and Geochemistry Division

Dr. P.J. Hood, Head, Regional Geophysics Subdivision

Dr. R.B. Campbell, Director, Cordilleran Geology Division, Vancouver

Dr. Roy D. Hyndman, Director, Pacific Geoscience Centre

Dr. R.E. Moore, Director, Surveys and Mapping Branch

Dr. M.J. Keen, Director, Atlantic Geoscience Centre

Dr. J.M. Zarzycki, Director, Topographical Survey Division, Surveys and Mapping Branch

Dr. M.J. Berry, Director, Seismology and Geomagnetism Division, Earth Physics Branch

M.R. Dence, Director, Gravity, Geothermics and Geodynamics Division, Earth Physics Branch

Dr. Kenneth Whitham, Assistant Deputy Minister, Research and Technology Sector, EMR

E.A. Godby, Director General, Canada Centre for Remote Sensing (CCRS)

Ralph Baker, Deputy Director General, CCRS

Leon Bronstein, Director, Data Acquisition Division, CCRS

E.W. Gardiner, Operations Manager, Innotech Aviation Ltd., CCRS Division

Dr. David Goodenough, Senior Research Scientist, Digital Methods Division, CCRS

Dr. Kirk Dawson, Regional Director, Pacific Region, Atmospheric Environment Service

C.R. Mann, Director General, Institute of Ocean Sciences, Department of Fisheries and Oceans

John Garrett, Head, Ocean Physics, Pacific Geoscience Centre

Sev Crowther, Head, Cartography, Pacific Geoscience Centre

Jack Patterson, Manager, B.C. and Yukon Chamber of Mines

Charles Aird, Consulting Engineer; Donald Mustard, General Manager SELCO Division, BP Resources Canada; Donald Rotherham, Chief Geologist, Placer Development Ltd.

Richard Marshall, Assistant Deputy Minister, Environment, B.C. Government

W.M. Evans, Director, Space and Policy Plans, MOSST

Dr. Karl Doetsch, Associate Director, National Aeronautical Establishment, and Director, Space Technology Office, NRC

Martin Litchfield, Superintendent of Foreign Management Development and Planning, Fraser Cos., Edmundston (by phone)

Dr. Richard Herring, Assistant Deputy Minister, Canadian Forest Service, Agriculture Canada

James McCulloch, Director General, Central Services Directorate, Environment Canada

Land Resource Research Institute (LRRI) - Agriculture Canada
Dr. J.S. Clark, Director, Land Resource Research Institute, Agriculture Canada

FORSTATS - Agriculture Canada
R.E. Keen, Manager, Canadian Forestry Data Program, PNI
Mr. R. Bryson, Manager, Forestry Data System, PNI
Dr. F.C. Pollett, Director, Petawawa National Forestry Institute, Chalk River
T. Moore, Finance Officer, PNI

Geological Survey of Canada, EMR
Dr. R.G. Blackadar, Director, Geological Information Division
Dr. P.J. Griffin, Assistant to R.G. Blackadar
Dr. J.C. McGlynn, Director, Precambrian Geology Division
Dr. D.C. Findlay, Director, Economic Geology and Minerology Division
Dr. J.S. Scott, Director, Terrain Sciences Division
Dr. W.W. Nassichuk (by phone), Director, Institute of Sedimentary and Petroleum Geology, Calgary

Surveys and Mapping Branch, EMR
A.L. McGuire, Programs, Surveys & Mapping Branch
Dr. J.M. Zarzycki, Director, Topographical Survey Division
J.A. McArthur, Director, Reproduction and Distribution Division
L.J. O'Brien, Dominion Geodesist and Director, Geodetic Surveys
W.V. Blackie, Surveyor General and Director, Legal Surveys
Dr. A.C. McEwen, Commissioner Canadian Section, International Boundary Commission
Richard Groot, Director, Geographical Surveys Division

National Research Council
R.A. Hewett, Building Code

Pedology Associates
L. Leskew (phone)

Hardy Associates
C. Heath (phone)

Fraser Companies
Mr. P. Belyea, Vice-President, Woodlands

MONENCO
Mr. D. Nancarrow

Ontario Centre for Remote Sensing
Mr. Victor Zsilinsky, Associate Director

SSC
Mr. D. Keys, Resources & Physical Research Group

Brad Ruth, Head of Statistics & Analysis
Scotia-Fundy Region
Fisheries and Oceans

Joe Arbor, Lands Directorate
Dave Wilson, Lands Directorate
Alan Longhurst, Director General
Clive Mason
John Elliott
Bedford Institute of Oceanography
Ocean Science & Surveys

D.A. (Sandy) MacLean, Deputy Minister
Nova Scotia Dept. of Fisheries

Frank Smith, President, Nordco Limited

Jacques Benoit, Ice Reconnaissance, Mobil Oil

G. Curtis, Mgr. St. John's Branch Kenting Earth Sciences

Doug Tilley, Head of Statistics and Analysis, Newfoundland Region
North Atlantic Fishery Org.

Jan Vanderhulft, Soils Scientist
Hazen Scarth, Land Use Planner
Dept. of Rural, Agricultural, Northern Development, Govt. of Newfoundland & Labrador

Al Soutar - General Manager
Sealand Helicopters

St. Andrews Biological Station
  Dr. David J. Scarratt, Deputy Director
  Hamish Scott, Biologist
  St. Andrews, New Brunswick,
  Dept. of Fish & Oceans

Fisheries & Oceans
  Hugh Trudeau - Area Manager
  Ron Smith - Statistics Coordinator

Ottawa, Environment Canada
  W. Falconer
  Self-Assessment Team

D. Knowles, Statistics & Analysis
  Fisheries & Oceans, Ottawa

David Good, DG, Strategic Policy and Planning, Fisheries and Oceans

J. Bruce, ADM, Atmospheric Environment Service, Environment Canada

(G.M. Shimizu and D. MacKay (senior planning officials) also in attendance)

W.B. Mountain, ADM, Environmental Conservation Service, Environment Canada

Ian Rutherford, Acting DG, Field Services Directorate, Atmospheric Environment Service (D. Russell of ADM's office also in attendance)

P.E. Merilee, Acting DG, Atmospheric Research Directorate, Atmospheric Environment Service (senior branch staff in attendance and also D. Russell)

P. Pender, Acting DG, Canadian Climate Centre, Atmospheric Environment Service (senior branch staff in attendance and also D. Russell)

P. Perron, Associate DM, Energy, Mines and Resources (F. Campbell, "G, Planning, also in attendance).

B.D. Blair, Assistant Administrator, Air Navigation Systems, Canadian Air Transportation Administration, Transport Canada

D.H. Champ, Ice Branch, Central Services Directorate, Atmospheric Environment Service (D. Russell also in attendance).

J. van Schaik, Agrometeorology Division, Agriculture Canada

D. Nowell, Meteorology and Oceanography Directorate, Dept. of National Defence

J.S. Wells, Assistant Chief Statistician, Statistics Canada (to discuss environmental indicators; R. Hoffman of Statistics Canada also present)

Mrs. Bursa, Canadian Federation of Canada (re: weather services for agriculture)

Bob Saunders, AES, Downsview (re proposed Amendment to Aeronautics Act to give CATA more authority in area of meteorology)

J. Benoit, Mobil Oil, St. John's, Newfoundland (re Ice Services)

R. Bulmer, Fisheries Council of Canada (re: weather services for fishing)

E. Dowdeswell, Pierce Commission on Water Policy (re her Task Force Report of 1983 on Weather Services)

K. Shikaze, Environment Canada, Self Assessment Team

R. Zarzycki, Energy, Mines and Resources (re RADARSAT)

I.B. Beesley, Prime Minister's Efficiency Unit, London, England (re Rayner reviews)

F.E. Whitehead, R. Barnes,
D.L. Pearce, R. Pease of the Office of
Population Census and Surveys,
London, England (re impact of
Rayner review)

B. Jordan, Overseas Development
Administration, London, England (re
impact of Rayner review of overseas
mapping)

T. Grove, Cartographic Services,
Department of the Environment,
England (re impact of Rayner
review)

P. Rider, Meteorological Office, Bracknell,
England (re impact of Rayner review)

D.L. Meyers, Deputy Auditor General

N. Gendreau, Director, Quebec
Bureau of Statistics

M. Paradis, Associate DM, Lands and
Forests, Government of Quebec.

PRINCIPAL ADVISORY, CONSULTATIVE AND CO-ORDINATING COMMITTEES/BODIES IN SUPPORT OF MAJOR FEDERAL SURVEYS

A. NATURAL RESOURCE AND ENVIRONMENTAL SURVEYS

Atmospheric Research
- Federal-Provincial Committee on Air Pollution

Canadian Hydrographic Service
- International Hydrographic Organization

Climate Services and Research
- National Climate Advisory Committee
- Climate Planning Board of Canada
- Federal-Provincial Committee on the Canadian Climate Program
- Canadian Council of Resource and Environment Ministers
- Expert Committee on Carbon Dioxide

Earth Physics/Geological Survey
- Industrial Advisory Committee
- Canadian Geoscience Council

Environment Canada - Lands Directorate
- Interdepartmental Committee on Land
- Canada Committee on Land Use
- Canada Committee on Ecological Land Classification
- Treasury Board Advisory Committee on Federal Land Management
- Canada Committee on Land Resource Services
- Western LRTAP Technical Co-ordinating Committee
- Canada/U.S. LRTAP Impact Assessment Working Group

Forestry Statistics
- Canadian Forest Inventory Committee

Hydrography
- International Hydrographic Organization

Land Resource Research Institute
- Canadian Soil Survey Committee

Oceanography
- Fisheries and Oceans Research Advisory Committee
- Canadian Committee on Oceanography
- Intergovernmental Oceanographic Committee of UNESCO
- Interdepartmental Committee on Oceans
- International Council for the Exploration of the Sea
- Food and Agricultural Organization (FAO)
- Scientific Committee for Oceanic Research

Remote Sensing
- Interagency Committee on Remote Sensing
- Canadian Advisory Committee on Remote Sensing
- Interprovincial and Territories Advisory Sub-Committee on Remote Sensing

Surveys and Mapping
- National Advisory Committee on Control Surveys and Mapping
- Advisory Committee on the National Atlas
- Canadian Permanent Committee on Geographical Names
- Canadian Council on Surveying and Mapping
- Interdepartmental Committee on Aeronautical Charting
- Interdepartmental Co-ordinating Committee on Control Surveys
- Interdepartmental Committee on Air Surveys
- Interagency Committee on Geographical Information Systems Management
- Interdepartmental Co-ordinating Committee on Offshore Surveys

Water Management Data
- Canada/U.S. Committee on Saint John River Water Quality
- Canada/U.S. Technical Sub-committee on Flood Control Review
- Great Lakes Basic Hydraulic and Hydrologic Data Co-ordinating Committee
- Niagara River Toxics Committee
- North Atlantic Hydrology Group
- U.S. G.S. Interagency Advisory Committee on Water Data
- Water Data for Public Use Advisory Committee
- International Joint Commission (IJC)

Canadian HOMS National Reference Centre
Steering Committee
Canadian Meteorological and Oceanographical
Society
Canadian Water Resources Association
Eau du Québec
Environmental and Water Sciences Technology
Advisory Committee
Hydrology of the Prairie Environment Research
Support Program Liaison Group
IWD Research Co-ordinator Committee
NRCC Associate Committee for Research on
Shoreline Erosion
NRCC Associate Committee on Hydrology
NRCC Associate Committee on Scientific
Criteria for Environmental Quality
Water Research Advisory Committee
Federal-Provincial Co-ordinating Committee
for Hydrometric Agreements
Federal-Provincial Flood Damage Reduction
Program Steering Committee
Federal-Provincial Committee on Water Quality
Monitoring
Federal-Provincial Working Group on Drinking
Water
Task Force on Federal-Provincial Water
Quality Agreements
Altantic Water Resources Group
Prairie Provinces Water Board
Canada Water Year Book Editorial Board
Co-ordinating Committees for the Hydrometric
Agreements in the Northwest and Yukon
Territories
Toxic Chemicals Committee
Great Lakes Water Group
Interdepartmental Committee on Water
Interdepartmental Committee on Oceans
N.W.T. Water Board
Pacific Region Acid Rain Committee
Pollution Abatement Research Committee
University-Related Activities Working Group
Steering Committee on Water Resources
Research in Canada

Weather Services
Joint Aviation Weather Committee
Provincial Farm Weather Service Committees
Expert Committee on Agrometeorology

B. SOCIO-ECONOMIC SURVEYS

Health and Welfare
- NHW/Statistics Canada Liaison Committee

Labour Canada
- Survey Co-ordination Committee
- Labour Canada/Statistics Canada Committee

National Revenue - Taxation
- Steering Committee
- Joint RCT/SC Committee

Statistics Canada
- Federal-Provincial Committee on Business Statistics
- Federal-Provincial Committee on the Census of Population, Housing and Structures
- Federal-Provincial Committee on Data Dissemination
- Federal-Provincial Committee on Social Statistics
- Federal-Provincial Committee on Energy Statistics
- Federal-Provincial Committee on Labour Statistics
- Federal-Provincial Committee on Agricultural Statistics
- Federal-Provincial Committee on Provincial Economic Accounts
- Federal-Provincial Committee on Transportation Statistics
- Federal-Provincial Committee on Small Area Data
- Federal-Provincial Committee on Mineral Statistics
- Vital Statistics Council of Canada
- Intergovernmental Conference on Local Government Information Development
- Advisory Committee on Agriculture
- Advisory Committee on 1986 Census
- Advisory Committee on Construction and Manufacturing
- Advisory Committee on Culture Statistics
- Advisory Committee on Demographic Statistics and Services
- Advisory Committee on Education

Justice Information Council
Advisory Committee on Labour Statistics
National Accounts Advisory Committee
Price Measurement Advisory Committee
Advisory Committee on Statistical Methods
Advisory Committee on Statistics on Social Conditions
Advisory Committee on Science and Technology Statistics

LIST OF FEDERAL SPATIAL DATA SETS IN CANADA

SOURCE: Tomlinson Associates:
Investigation of Digital Cartographic
Status and Development in Canada
(compiled for EMR, March 1984)

NOTE: Out of 248 data sets quoted in the study, 146 are federal. Their list follows.

INDEX OF INVENTORY BY THEME AND SUBTHEME ON 03/28/84

	DATA SET NAME	ENTRY NUMBER
THEME:	Agriculture	
	CLI Land Capability for Agriculture	AG01
	CLI Land Capability for Agriculture (Coverage 200,201,203)	AG04
	CLI Land Capability for Agriculture (Coverage 205)	AG05
THEME:	Climate/Meteorology	
	Climatic Information for Building Design in Canda (CDX)	CM02
	Gridded Surface Air Pressures	CM04
	National Ice/Wind Load Archive	CM05
	National Tornado Archive	CM06
	Solar Radiation Merged Data File	CM07
THEME:	Forestry	
	CARE (Computer Assisted Resource Evaluation)	FO03
	CLI Land Capability for Forestry (Coverage 300)	FO04
	CLI Land Capability for Forestry (Coverage 302)	FO05
	CLI Land Capability for Forestry (Coverage 305)	FO06
	Forest Cells, 1981	FO10
	National Forest Biomass Data Set	FO17
	National Forest Inventory Data Set	FO18
THEME:	Geodesy	
	Air Survey Data Base	GD01
	Bench Mark Cards	GD02

	DATA SET NAME	ENTRY NUMBER
	Control Survey Data Bank	GD03
	International Boundary Commission Data Base	GD06
	National Gedodetic Data Base	GD07
	Stereo-Model Mensuration	GD10
THEME:	Geology	
	CANMINDEX Mineral Data Bank	GE01
	MINSYS	GE07
	National Geochemical Reconnaissance, Uranium Reconnaissance	GE08
THEME:	Geophysics	GP01
	Canadian Aeromagnetic Three-Component Half-minute Averages	GP01
	Canadian Magnetic Observatory Data	GP02
	Canadian Seismic Station Data	GP03
	Historical Earthquake File	GP04
	Hudson Bay Shipborne Total Field 5-Minute Averages	GP05
	Magnetic Declination File	GP06
	Magnetic Field Survey Data (source file)	GP07
	National Gravity Data Base	GP08
THEME:	Imagery	
	Airborne MEIS	IM01
	Airborne MSS	IM02
	HCMM (Heat capacity mapping)	IM03
	Image Inventory Search System (IISS)	IM04
	L Band, HH Polarized, SEASAT a SAR data	IM05
	Landsat Digital Image Correction System (DICS) Imagery	IM06
	Landsat MSS Bulk Processed Imagery	IM07
	NOAA High Resolution Picture Transmission (HRPT) Data	IM09
	SAR 580 Data	IM11
	Thematic Mapper (TM)	IM13
	Visible and Infrared Spin-Scan Radiometer (VISSR) Data	IM14
THEME:	Land	
	Administrative Districts, Algonquin Park	LA01
	Alberta National Parks - Biophysical	LA03
	BC National Parks - Biophysical	LA05

DATA SET NAME	ENTRY NUMBER
Beaufort Sea Regional Study	LA06
Biophysical Data and Forest Cover, Pukaskwa National Park	LA07
Biophysical Resources Inventory, Cape Breton Highlands	LA08
Biophysical Resources Inventory, Firth River	LA09
Biophysical Resources Inventory, Forillon National Park	LA10
Biophysical Resources Inventory, Fundy National Park	LA11
Biophysical Resources Inventory, Gros Morne National Park	LA12
Biophysical Resources Inventory, Nahanni National Park	LA13
Biophysical Resources Inventory, Terra Nova National Park	LA14
Biophysical Resources Inventory, Wood Buffalo National Park	LA15
Census Divisions, 1976	LA16
Census Divisions, 1976 (Agriculture Projects)	LA17
Census Divisions, 1981	LA18
Census Divisions, 1981	LA19
Census Geography Master File (CGMF)	LA20
Census Tracts, 1976	LA21
Census Tracts, 1981	LA22
CLI Present Land Use 1966 (coverage 700) and updates '71 & '76	LA23
CLI Present Land Use 1966 (coverage 705)	LA24
CMA Centres 1:500,000	LA25
CMHC Windsor Project	LA26
Department Reference Map Data Sets (BC)	LA27
Ecozones	LA28
Federal Electoral Districts, 1976	LA29
Federal Lands 1:250,000	LA30
Federal Lands 1:50,000	LA31
Federal/Provincial Lands Point Data 1:250,000	LA32
Federal/Provincial Lands Point Data 1:50,000	LA33
Forillon National Park - 1979 Zoning and Shoreline	LA35
Forillon National Park - Conservation Zone	LA36
Hudson Bay Lowlands Biophysical Data	LA39

	DATA SET NAME	**ENTRY NUMBER**
	Labour Force Economic Regions, 1971	LA40
	Labrador Ecodistricts (Coverage 9177)	LA41
	LRTAP Bedrock Geology/Ecodistricts/Land Inventory/Watershed	LA44
	Northern Land Transaction System Data	LA46
	Ontario Biophysical Districts	LA49
	Provinces/Territories of Canada	LA50
	Qu'Appelle Valley Study, Saskatchewan	LA51
	Quebec Hydro Côte-Nord Project	LA52
	Saskatchewan Land Systems	LA54
	Saskatchewan National Parks - Biophysical	LA55
	Saugeen Basin Land Use	LA56
	Thames River Study	LA57
	Vegetation Cover, Fire Origin - Nahanni National Park	LA58
	Yukon Ecological Land Survey (ELS)	LA59
THEME:	Recreation/Parks	
	Capability of Water Bodies for Sportfish (Coverage 615)	RP02
	CLI Land Capability for Recreation (Coverage 600)	RP03
	CLI Land Capability for Recreation (Coverage 605)	RP04
THEME:	Socio-economic	
	1976 Census Boundaries - 1:250,000 (Coverage 035)	SE01
	1976 Census Boundaries - 1:500,000 (Coverage 036)	SE02
	Major UCR Boundaries 1:50,000 (Coverage 040)	SE06
THEME:	Soil	
	Geochemistry of Canadian Till	S022
	Soils of Alberta	S003
	Soils of BC	S004
	Soils of Manitoba 1:100,000, 1:125,000 1:126,720	S005
	Soils of Manitoba 1:20,000	S006
	Soils of Manitoba 1:40,000	S007
	Soils of New Brunswick	S008
	Soils of Newfoundland	S009
	Soils of Nova Scotia	S010
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	DATA SET NAME	**ENTRY NUMBER**
	Soils of Prince Edward Island	SO12
	Soils of Quebec	SO13
	Soils of Saskatchewan	SO14
	Soils of the Yukon and NWT	SO15
THEME:	Topography	
	Base Map of Canada 1:7,500,000	TP01
	Muncipal Atlas Program (MAP)	TP04
	National Toponymic Data Base	TP06
THEME:	Terrain	
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	Terrain Mean Heights in Canada	TR06
THEME:	Water	
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	Gazetteer of Undersea Names	WA14
	HYDAT Data Bank	WA16
	Nautical Charts	WA20
	Oceans (Physical & Chemical Data at Monitoring Stations (F&O)	WA23
	Sediment Studies Data	WA25
	Shoreline (Coverage 100) 1:50,000	WA27
	Shoreline (Coverage 102) 1:125,000	WA28
	Shoreline (Coverage 105) 1:250,000	WA29
	Shoreline 1:1,000,000 and 1:7,500,000 (Coverage 107 and 108)	WA30
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	Square Grid Physiographic Data	WA32
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	DATA SET NAME	ENTRY NUMBER
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	Bird Hunting Zones	WI02
	Breeding Bird Survey File	WI03
	CLI Land Capability for Wildlife - Ungulates (Coverage 400)	WI04
	CLI Land Capability for Wildlife - Ungulates (Coverage 405)	WI05
	CLI Land Capability for Wildlife - Waterfowl (Coverage 500)	WI06
	CLI Land Capability for Wildlife - Waterfowl (Coverage 505)	WI07
	National Parks Wildlife Survey Data	WI08
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